5 Tools to MAKE YOU a BETTER Woodworker

Face Frames: The Secret to SUPER-STRONG Cabinet Construction

Woodsmith®

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Vol. 33 / No. 198

Cherry ARMOIRE

> Rock-Solid Frame & Panel Construction

> Versatile Storage Options

> Simple Moldings Add Elegant Details

Also:

Build It Right: From Paper Plan to Perfect Project

Clean Cuts Every Time — 3 Must-Have Table Saw Blades

A Publication of August Home Publishing

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The casual look of this small bench comes from its graceful curves and sculpted seat. To ensure it lasts for years to come, it's built with traditional mortise and tenon joinery.

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heirloom project

Woodsmith GO ONLINE EXTRAS

Cherry Armoire 30

This stylish armoire has a lot going for it. First, with the two-tone finish and simple details, it looks great. Second, there's loads of storage. And finally, the construction is quick and easy.

Cherry Armoire page 30

editor's note

Sawdust

While I'm always happy about the projects and department articles we feature in each issue of *Woodsmith*, there's one new project development I'm really excited about. And that's the release of a DVD collection of the first four seasons of the *Woodsmith Shop* television show.

Each season consists of 13 episodes (30-minute shows) that are on a pair of DVDs. If you've watched the shows, you know we mention the free plans, articles, and extra videos that are available online. But we've included all that information on a separate CD (that's included with the DVD set). So, everything that was shown on the original TV show and online, is now in the boxed set.

Now, you can watch any episode at your convenience. If you didn't catch something the first time, it's a simple matter to view any segment of a show as often as you'd like. You can find out how to order the complete DVD set (or individual seasons) by turning to Sources on page 51.

Finally, we're closing in on the publication of our 200th issue, which you'll receive in a few months. We're working on making the issue extra special. But rest assured, it will still feature the same great projects, techniques, and tips that you've come to expect. Many of you have been with us from the beginning, while for some it's only been a few years. For that, the entire staff and I would like to thank you for your support and encouragement. We couldn't have done it without you.

Bryan

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Tips & Techniques

Adjustable Sanding Jig

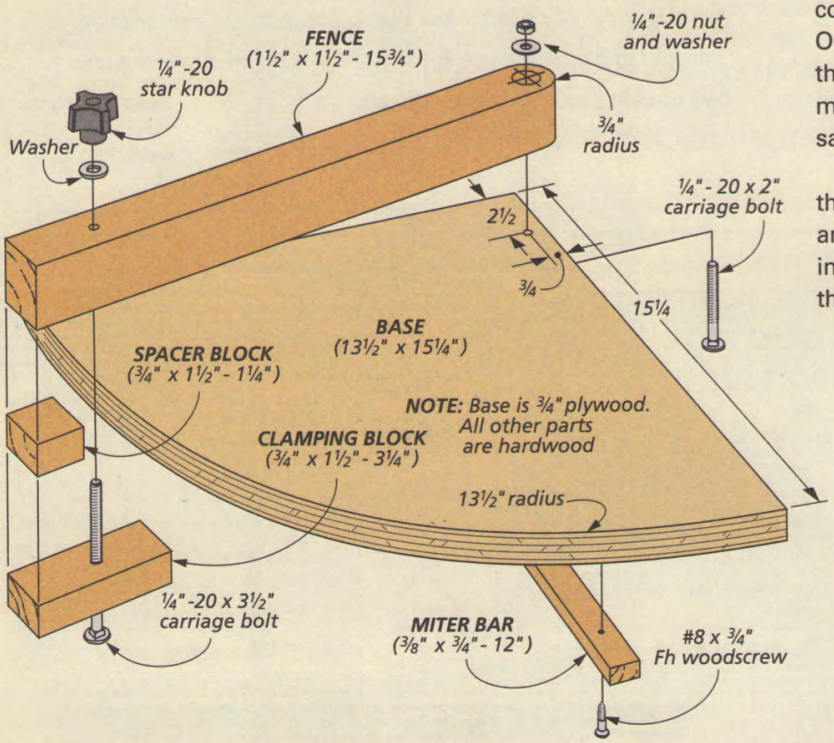
There are times when I need to sand a miter cut on a workpiece to get a tighter fit. The trouble is, it can be difficult to hold the workpiece at the correct angle to the sander. So I built the sanding jig in the photo. This fence gives me better support for my workpiece than a miter gauge could, which makes the miter more precise.

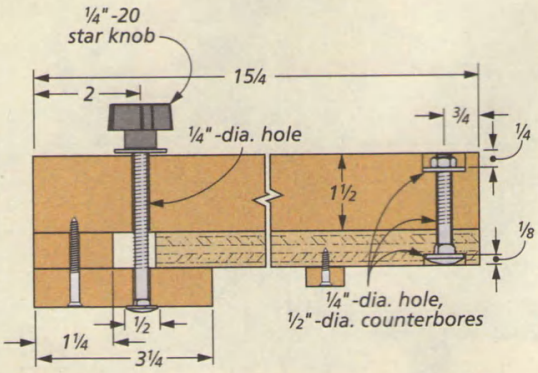
The base of the jig is a piece of plywood with a radius cut on one corner (drawing below). On the underside of the base, I attached a miter bar to register the sander to the table.

In one corner of the base, I attached an adjustable pivoting fence. One end of the fence is bolted to the base with a carriage bolt. The other end is held in place by a three-piece clamp tightened with a knob and carriage bolt.

You can use a protractor or a bevel gauge to adjust the fence to the angle that you need to sand. Then slide the workpiece against the fence for an accurate sanded miter.

John Tate
Sun City, Arizona



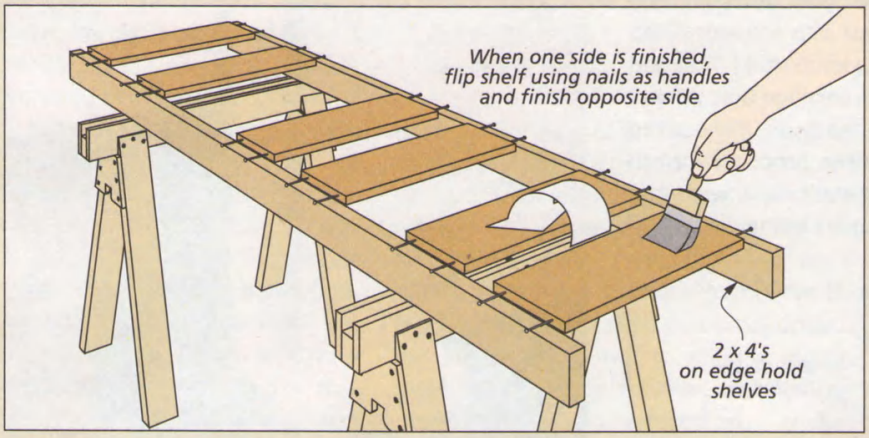


Finish Shelves Fast

I had to apply finish to a number of bookcase shelves, and I didn't want to wait for one side to dry before I finished the other side. The drying rack you see in the drawing is my solution.

It's just a couple of 2x4s set on edge across two sawhorses. To hold the shelves, I drove finish nails in the ends of each shelf so they could rest on the 2x4s. The nails also serve as handles to flip the shelves when one side is complete. This keeps my fingerprints out of the finish and allows both sides to dry at once.

Tony Gallo
Brampton, Ontario



Scraper Caddy

I have a number of card scrapers in different thicknesses and shapes. I needed a place to keep them organized and sharp. A simple caddy that goes to my bench was just the ticket.

As you can see in the photo, it's just a block of wood with several kerfs cut across it. I found the kerf from a hand saw made perfectly sized slots.

With this caddy, I now have all my scrapers in one location and the edges are safe from dings and dents. Plus, it stores easily on a shelf.

Donald Henderson
Orleans, Ontario

SUBMIT YOUR TIPS ONLINE

If you have an original shop tip, we would like to hear from you and consider publishing your tip in one or more of our publications. Go to:

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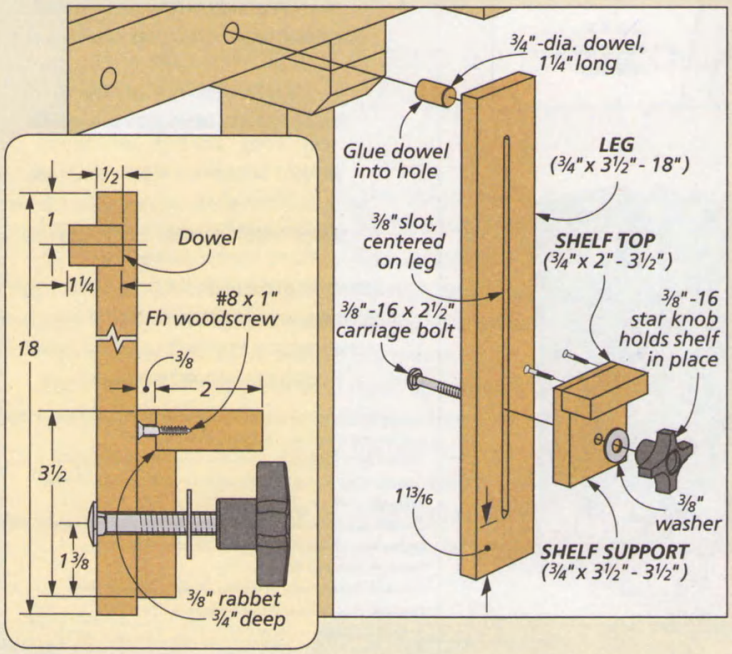
Board Jack

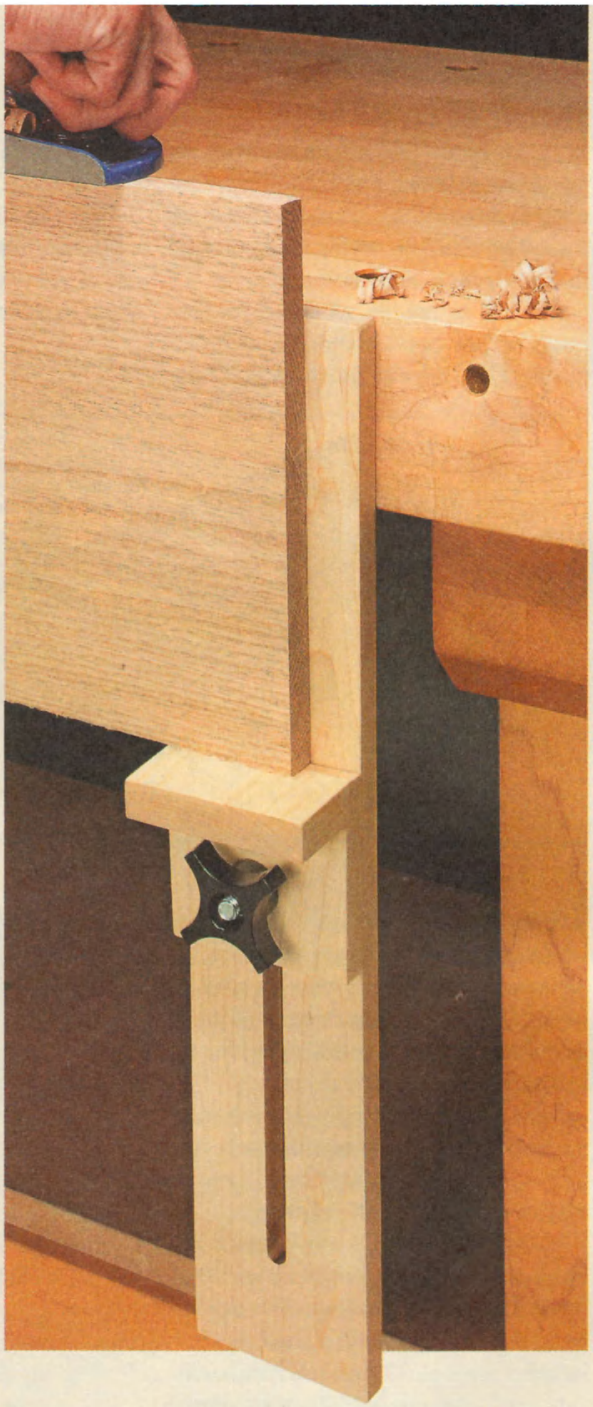
I sometimes have long or wide boards that I need to clamp at my workbench. The face vise will hold one end, but the opposite end needs support. So I built this board jack to support the end opposite the vise.

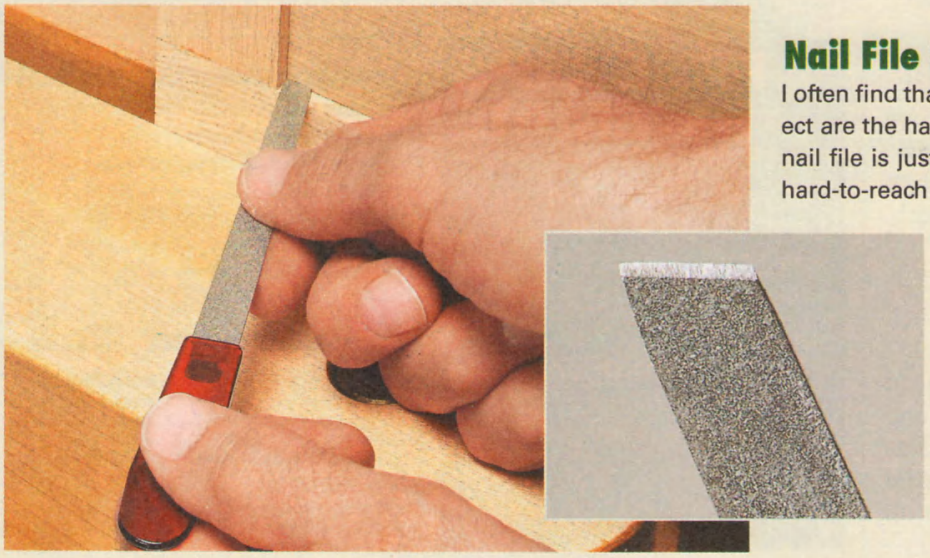
To build the jack, I routed a narrow slot in the center of a board and then drilled a hole at one end to attach a dowel. The dowel slips into a hole in the front edge of your workbench. An adjustable support is fixed to the slotted board to hold one end of the workpiece.

I drilled a hole in the face of the shelf and inserted a carriage bolt through the hole and into the slot. Then added a knob that I threaded over the carriage bolt. When I tighten the knob, it keeps the shelf at the proper height to support the board, while the other end is in the vise.

Oneil Long
Mound City, Missouri







Nail File Sander

I often find that the smallest glueup flaws in a project are the hardest to clean up. But a metal fingernail file is just the right size for getting into those hard-to-reach areas where glue squeezes out.

I picked up the file shown in the photo at the drugstore. To make it easier to work with, I ground the tip of the file to a 45° angle. Then I put a sharp bevel on the tip to create a mini-chisel. The edge on the file gets into the smallest nooks of my project to clean up any trouble spots.

Peter Sherrill
Forestville, Wisconsin

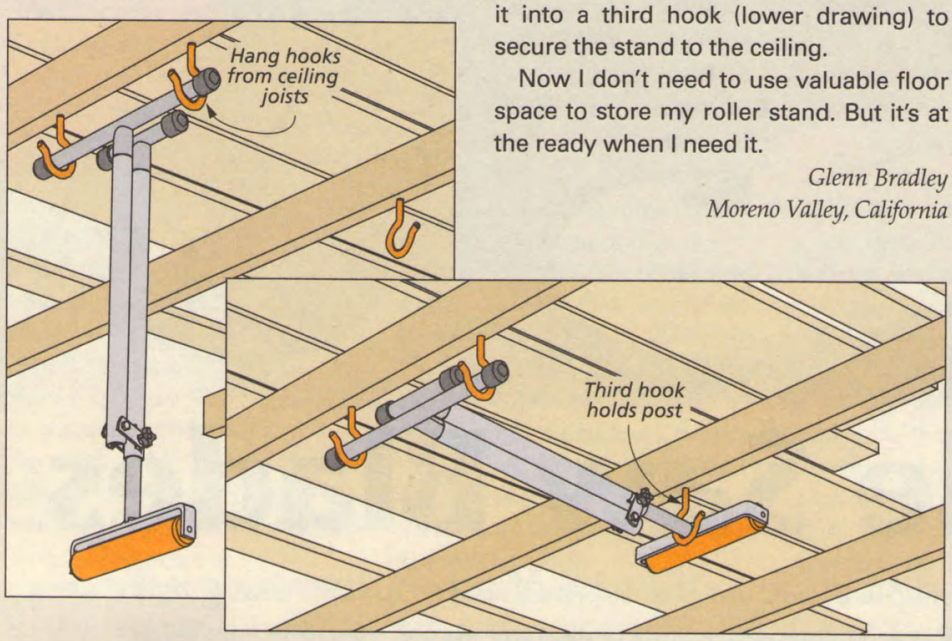
Outfeed Roller Storage

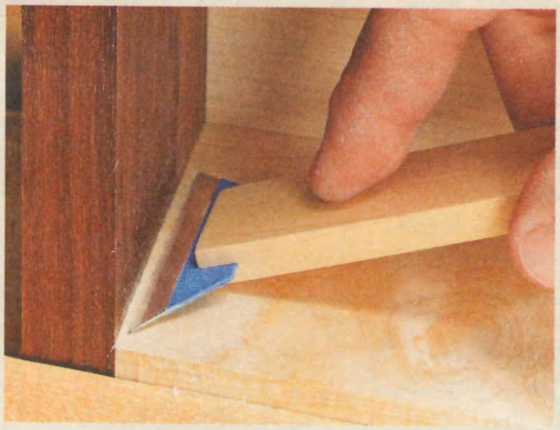
I use an outfeed roller a lot in my woodworking shop. But I don't need one set up all the time. Even though it folds flat, I keep it out of the way by storing it overhead. The ceiling joists are a perfect place to hang it.

To do this, I hung three bicycle hooks from the joists in my garage shop. When I need to store the stand, I just hook the legs onto two of the hooks (left drawing). Then I swing up the other end and slip it into a third hook (lower drawing) to secure the stand to the ceiling.

Now I don't need to use valuable floor space to store my roller stand. But it's at the ready when I need it.

Glenn Bradley
Moreno Valley, California





Mini Scraper

Utility knife blades make great mini scrapers. But the small blades are hard to hold onto. A wood handle keeps it stable.

I just cut a slot in the end of a thin scrap piece, about the same thickness as the blade. Then I inserted the blade in the slot, using a piece of masking tape to grip it securely.

Ron Duchek
St. Louis, Missouri

WIN THIS BOSCH IMPACT DRIVER

Simply send us your favorite shop tips. If your tip or technique is selected as the featured reader's tip, you'll win a *Bosch* impact driver just like the one shown here. To submit your tip or technique, just go online to *Woodsmith.com* and click on the link, "SUBMIT A TIP." You can submit your tip and upload your photos for consideration.

The Winner!

Congratulations to, Oneil Long, winner of this Bosch impact driver. To find out how you could win this driver, check out the information on the left.

Quick Tips

ROUTER STABILIZER

I like to keep a guide bushing installed in one of my routers. But the bushing prevents the router from sitting flat for storage.

My solution is to stand the router upright on top of a small V-belt. The belt is just high enough to provide clearance for the bushing and allows the router baseplate to rest on the belt.

Serge Duclos
Delson, Quebec

EMERGENCY BUFFER

I needed to buff out a large tabletop that I had applied wax to, but I didn't have a pad or a buffer.

To accomplish the task, I decided to use a piece of a soft terry cloth towel cut to fit my orbital sander. It worked great and the towel stuck well to the hook and loop pad on the sander. When I was done, I just tossed the piece of towel.

Ross Henton
Frisco, Texas

FITTING DRAWERS

When I'm fitting drawers in a cabinet, I find that getting a drawer out that's slid in flush presents a problem. Since the drawer doesn't have a knob or handle on it yet, I need a simple way to remove it from the cabinet. But I don't want to mar the drawer by prying it out with a tool.

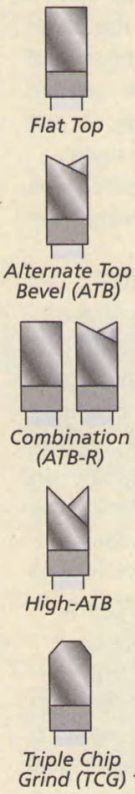
Instead, I turn to my shop vacuum. The suction from the vacuum holds tight to the front of the drawer and doesn't leave any marks on the unfinished wood.

Melissa DeLay
Shoreview, Minnesota

Table Saw Blades

Matching the right blade to the type of cut you're making is the key to getting professional-quality results from your table saw.

Tooth Configurations

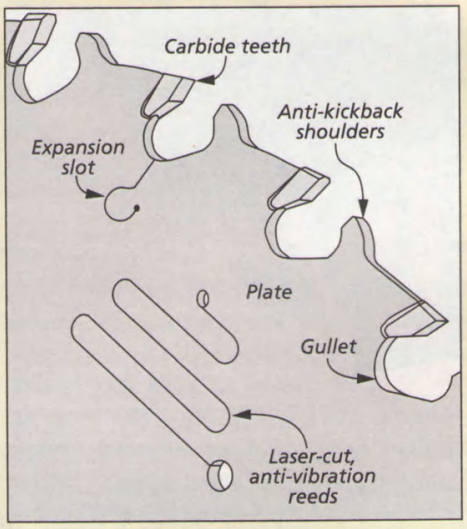


If you were to peek into most woodshops, chances are you'd find a table saw near the center of each one. With it, you can rip stock to width, crosscut workpieces to length, and create many different kinds of joinery.

It will only do these things well if you install the right blade for each task. If you don't, you might get rough cuts, tearout, or burnt edges. Worse yet, you could risk kickback during a cut.

WHAT'S THE DIFFERENCE? In order to learn how blades are designed for different tasks, you need to understand the common parts of the blade. You can start by taking a look at the drawing at right. As you can see, the blade begins with a steel plate, and ends in teeth tipped with carbide.

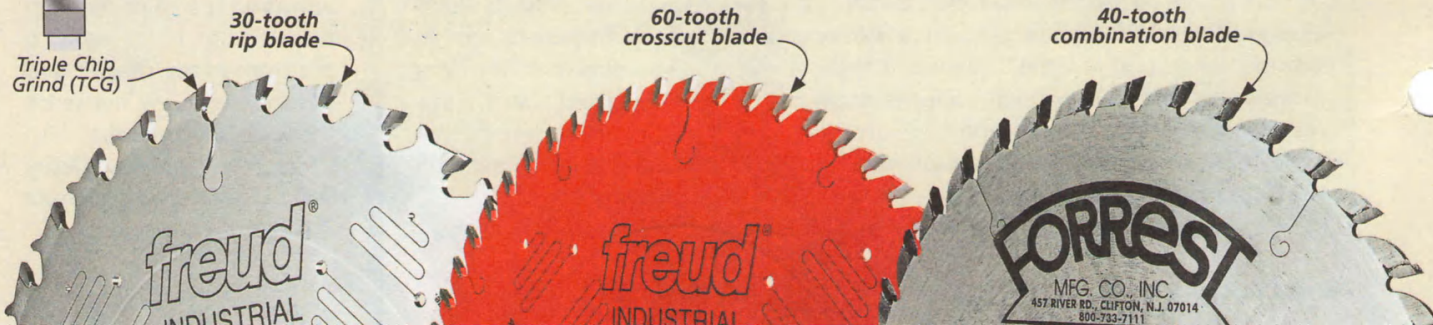
Another feature of blade design is the laser cutouts in the plate. As technology improved, laser-cut expansion and anti-vibration slots were added to improve performance. These slots reduce vibration and help keep the blade cool, reducing blade warp due to heat build-up.



But it's mainly the teeth and gullets that differentiate the three major types of blades — rip, crosscut, and combination. I'll take a look at each of these blades individually.

The type, number, and configuration of the teeth vary according to the task. The drawings in the margin show the shapes of the teeth and the different combinations.

RIP BLADES. Rip cuts are made along the length of a workpiece, in



line with the direction of the grain. As the name implies, this cut separates the grain by ripping between the layers. For this type of cut, you don't need a lot of teeth. In fact, too many only cause the wood to burn. A blade with 24-30 teeth and a flat-top configuration is perfect. The combination of fewer teeth and flat-top design help prevents the saw from bogging down in thick stock.

In addition to the flat-top teeth, rip blades also have deep gullets. It's the gullets that allow the large amount of chips and dust to be carried out of the cut. If the chips can't escape, the blade will heat up and burn the edge of the workpiece.

CROSSCUT BLADES. At the other end of the spectrum is the crosscut blade. Since a crosscut is perpendicular to the grain direction, you want more teeth to slice through the fibers rather than ripping them. The right tooth for this kind of cut has to be sharp enough to score the fibers and slice them cleanly. The alternate top bevel (ATB) teeth fill the bill perfectly. The result is a clean cut in solid wood.

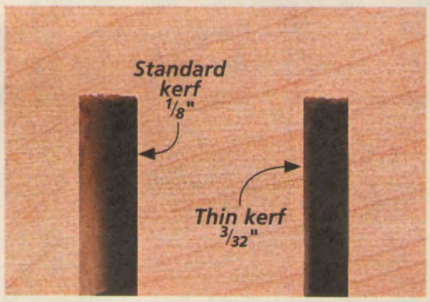
You'll find that a 60-tooth count is the norm for table saw crosscut blades. As you can see in the drawings at right, the gullets of crosscut blades are shallower than the rip blades. These shallower gullets are all you need to carry away the smaller chips from a crosscut.

COMBINATION BLADE. A combination blade is a compromise between a rip and crosscut blade. It will do either task reasonably well, depending on the thickness of the stock. It also works well for plywood and other sheet goods.

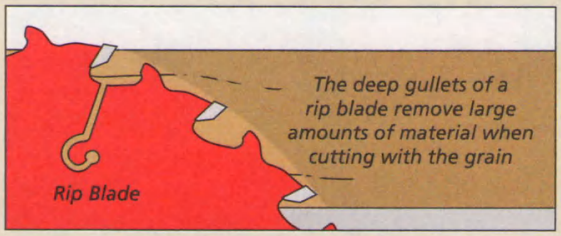
You'll normally find 40-50 teeth on a combination blade. Many combination blades add a flat-top or raker tooth to the ATB design for smoother rip cuts. This ATB-R has become common on combination blades from many manufacturers.

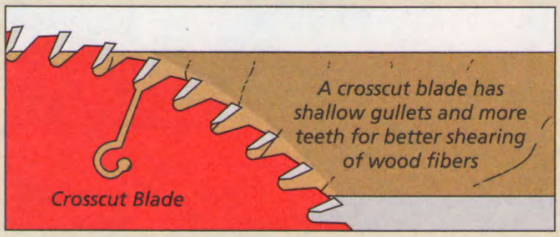
THIN-KERF BLADES. Another feature to consider when shopping for blades is the thickness of the blade. Crosscut, rip, and combination blades are available in both standard and thin-kerf designs. Thin-kerf blades are a great choice for most saws. The plate and teeth are 25% thinner than conventional blades (usually around 3/32" instead of 1/8"). This reduces the workload for the saw and makes it easier to cut thick stock with a lower-powered saw. I keep a thin-kerf combination blade on my saw most of the time.

Finally, my best advice is to buy a top-quality product (refer to Sources on page 51). It will pay you back every time you use your saw. No matter what the task, the right blade can improve the quality of your work.



▲ A thin kerf might not seem like much of a difference, but it reduces the workload on your saw by 25%.





Top-Notch Blade: Freud's Premier Fusion

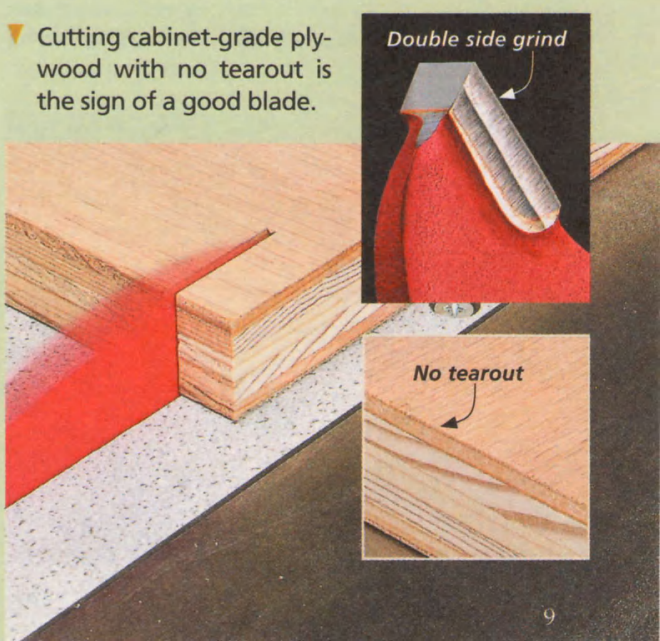
I've been a fan of *Freud* blades for many years. For me, it's tough to beat the quality of their products for the price. Recently, I tried out their *Premier Fusion* combination blade. This blade is priced about 50% higher than their conventional blades, so I was anxious to see if the performance justified the cost.

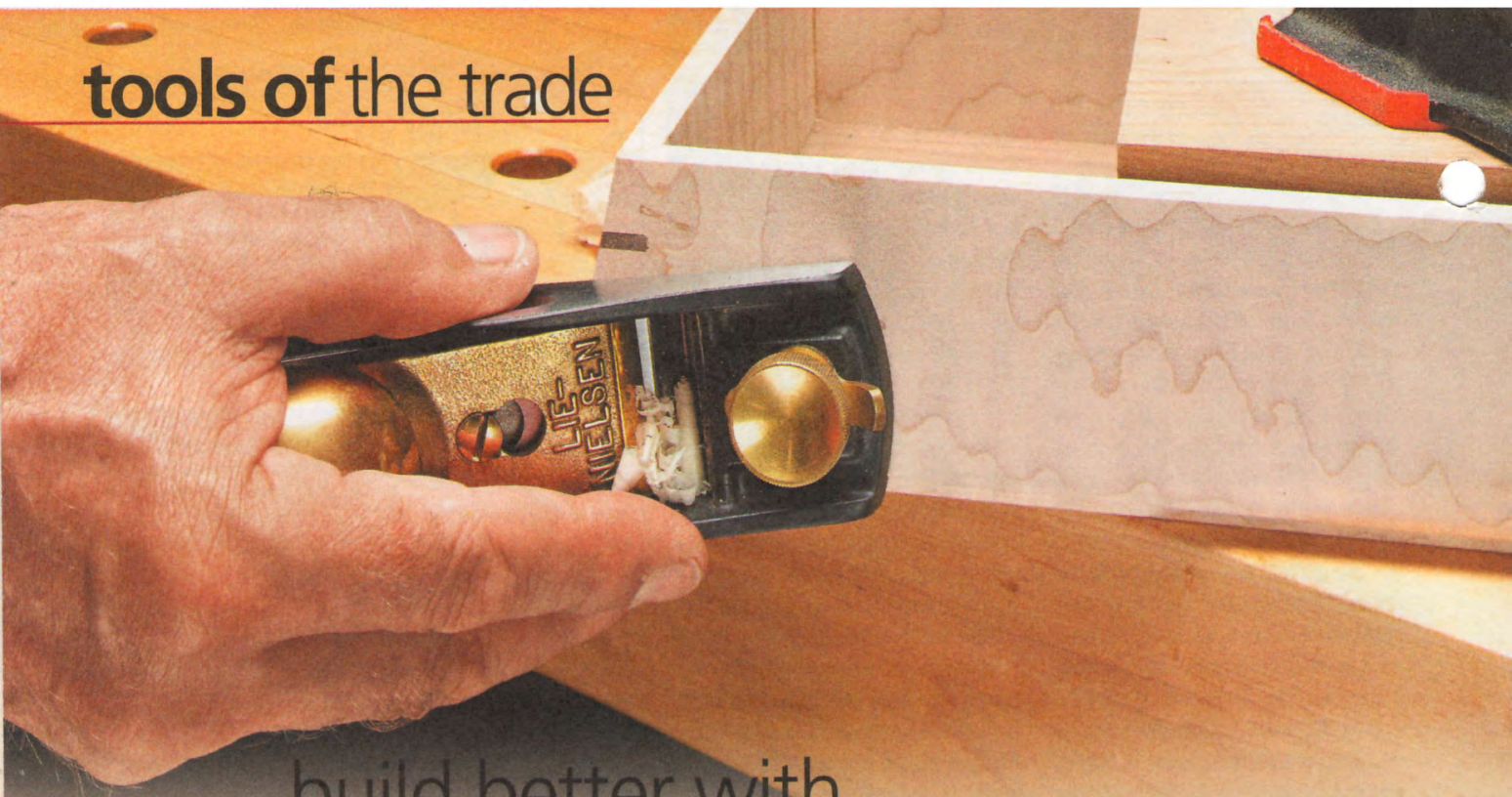
WHAT IS IT? At first glance, the *Premier Fusion* looks like most *Freud* blades, right down to the familiar red, non-stick coating.

The teeth are made from *Freud's* unique micro-grain carbide called TiCo — a combination of titanium and cobalt. But what's different here is the profile of the teeth. The Hi-ATB configuration also relies on a special double side grind in the sharpening process (see inset photo at right). This creates two cutting surfaces for a smooth face on all sorts of cuts.

As you can see in the photos at right, the *Fusion* crosscut the face veneer of some cabinet-grade plywood without leaving a splinter. Not many blades can boast a cut that clean. Best of all, it did that and virtually every other type of cut day after day. If you really don't like changing blades, this is the one for you.

▼ Cutting cabinet-grade plywood with no tearout is the sign of a good blade.





build better with

Top 5 Hand Tools

To take the quality of your work to the next level, turn back the clock and learn about some "old-school" tools.

In the debate over hand tools versus power tools, my position is a simple one: Use the tool that makes the most sense for a particular task. For most woodworkers doing furniture projects, that means power tools. But even if you're a power-tool woodworker, there are still a few hand tools you shouldn't be without. And I don't mean just the measuring and marking tools that we all need.

As a rule, your power tools get you most of the way toward high-quality results. But a few hand tools will make them even better.

Hand tools can impart a bit of "finesse" to your woodworking projects by allowing you to work in small increments (often thousandths of an inch). And the more you use them, the more you'll appreciate the tools and the results.

You can find most of these tools in the online woodworking suppliers. Sources on page 51 has the information on the websites.

1 Card Scrapers

It's hard to imagine a tool that provides more bang for the buck than a card scraper. This simple, flat piece of steel can smooth a workpiece quickly and leave a beautiful surface that you won't need to touch with sandpaper. The secret is the cutting edge.

The scraper relies on a hook-shaped burr on the edge rather than a conventional, beveled blade. When properly sharpened, the hook produces wispy shavings.

Another nice thing about scrapers is that they're available in different profiles. One common type, the gooseneck, has a round shape that can be used to smooth convex surfaces. And by simply adjusting the angle, you can scrape more than a single radius curve.

I'm not saying you should throw away your sander. But the more proficient you become with a card scraper, the more you'll find yourself turning to it.

2 Shoulder Plane

When it comes to shaving a hair off of a tenon or cleaning up the bottom of a dado or groove, a shoulder plane is the tool for the job. There are a couple of unique features that make a shoulder plane a must-have tool.

First, the blade is just slightly wider than the body (usually only about 1/64"). And the blade is bedded at a low angle. This allows it to cut a crisp corner on the cheeks and shoulders of a tenon (hence the name).

Shoulder planes are sold in several sizes. I like a medium size, 3/4"-wide version. If you cut tenons at the table saw, you'll appreciate how well this plane cleans them up, as shown in the photo.

3 Set of Chisels

I don't think there can be much debate regarding the necessity of chisels — even in a power-tool shop. No matter what kind of work you do, a good set of chisels is one of the best tool investments you can make. They're essential for fine-tuning joinery, squaring up corners, and dozens of other common tasks.

The good news is, you don't have to spend a fortune to find a set of high-quality chisels. Several brands sold today combine value with long-lasting performance. There are a number of six-piece chisel sets for $60-80.

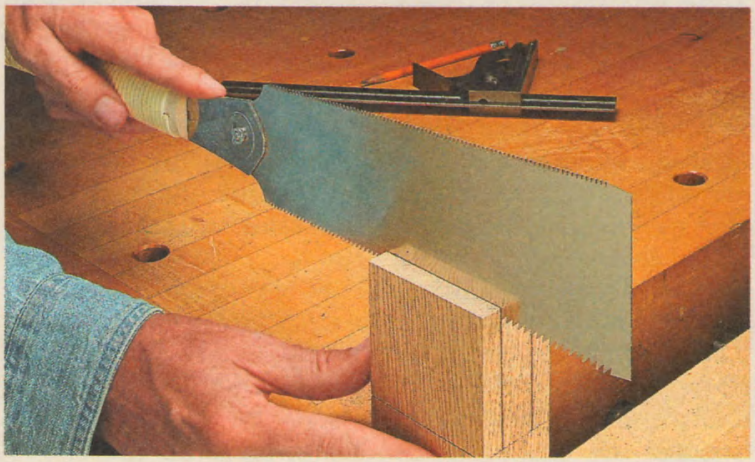
Look for a blade hardness of Rc58-62. This is hard enough to hold an edge well, but still soft enough to sharpen easily.

4 Ryoba Saw

No matter how confident and proficient you are at the table saw, there are plenty of cuts that are simpler and safer to make using a hand saw. And there's a perfect combination of value and quality in a Japanese-style *ryoba* saw. This double-edged saw has both crosscut and rip teeth.

The steel teeth are impulse hardened, so you'll never need to sharpen them. Instead, you can simply replace the blade.

Of course, if you prefer the Western alternative, then a couple of good back saws (one with rip teeth and the other crosscut) will serve the same purpose.

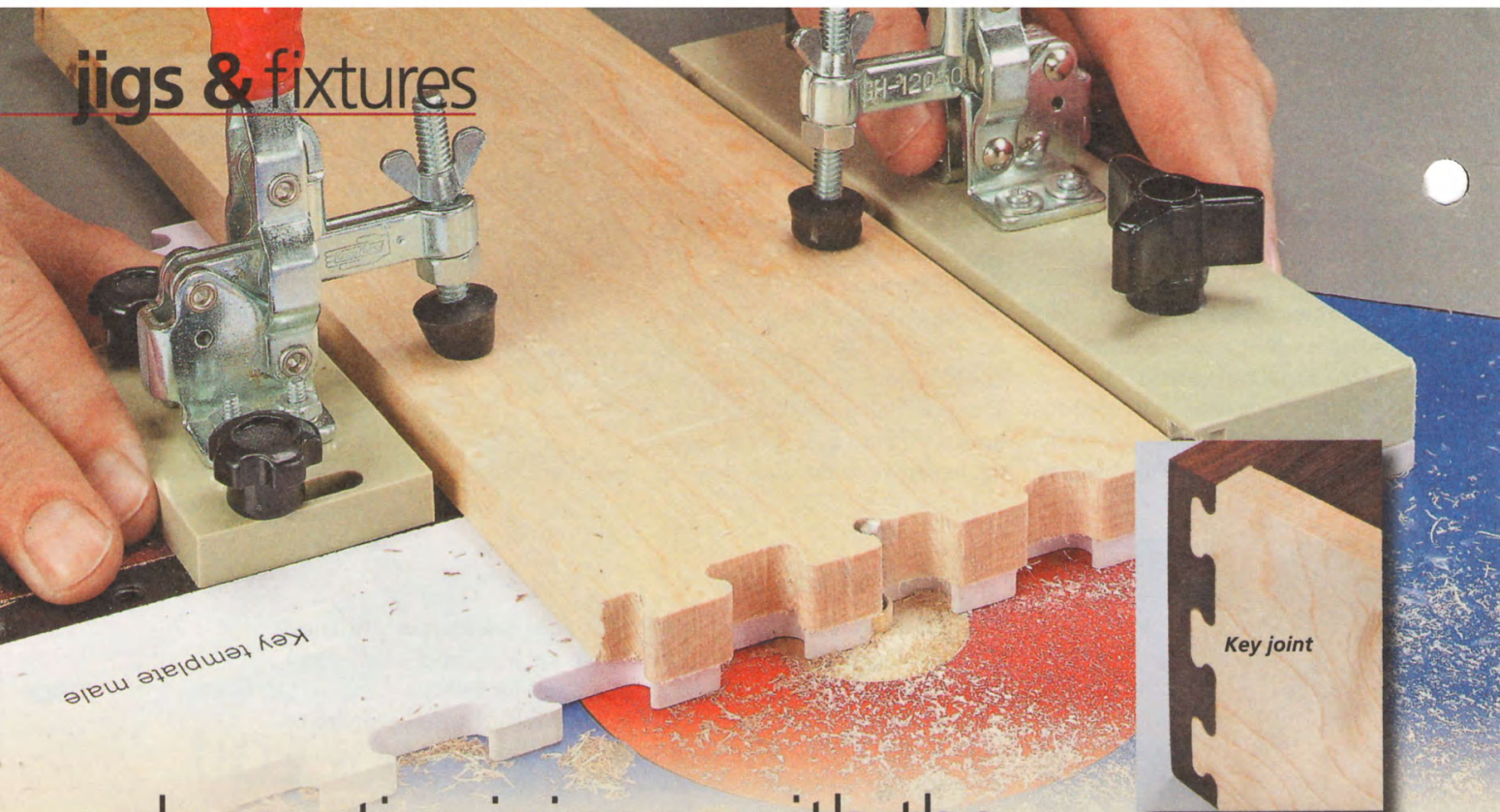


5 Block Plane

As a power-tool woodworker, I admit I was always a little bit intimidated about using a hand plane. There are so many different sizes and styles that I found it easier to simply ignore them all.

After a few years, however, I broke down and bought a block plane and I never looked back. There's just about no limit to what you can do with a high-quality, well-tuned block plane. From shaving down a proud dovetail or box joint (using a low-angle model) to chamfering an edge, once you learn to properly set up and use a block plane, you'll wonder how you ever got by without one.

Fortunately, it's not hard to find a good one, either. I'd advise buying a block plane that makes it easy to adjust the depth of cut. The planes from *Lie-Nielsen* and *Veritas* for instance, incorporate easy-to-use depth controls and are ready to use out of the box. W

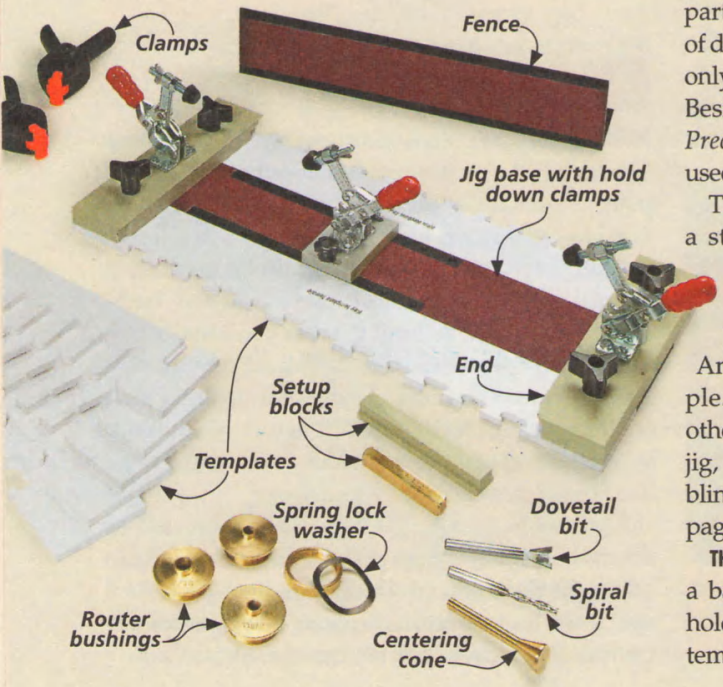


▲ The key template is included with the basic jig.

decorative joinery with the **Fast Joint Jig**

The easy-to-use jig allow you to make amazing joinery that adds a distinctive look to any drawer or box.

▼ Everything you need to make attractive, strong joints is included with the jig.



Dovetail joinery is a reliable and traditional way to join drawer parts. That's why there are a lot of dovetail jigs out there. But most only cut dovetails and box joints. Besides dovetails, the *Fast Joint Precision Joinery System* can be used to cut other decorative joints.

This jig takes routed joinery a step further by offering several distinctive designs, as you can see in the margin photo on the opposite page. And this is just a small sample. You'll find templates for other designs available with the jig, including conventional half-blind and through dovetails (see page 51 for sources).

THE BASICS. The jig consists of a base and two end fences that hold a pair of templates. The templates are referred to as "male" and "female" (more familiar terms are tails and pins). One side of the box or a drawer side is clamped flat to the jig and routed on a router table with the included bit, following the male template. The mating side of the box or drawer front is clamped upright against a fence and routed using the female template. All you need to do is guide the template against a bushing mounted in the insert plate.

ALL INCLUSIVE. Everything you need to make decorative joints is included with the joinery system (left photo). The jig needs some assembly, but all the parts are cut to exact specifications. During assembly you'll want to take extra care to square the side fences to the base. This helps you rout precise joints.

ROUTER SETUP. Before using the jig, be sure to take some time to tune up your router table. You'll want to make sure the insert plate is flush with the router tabletop. And you'll need a router plate that accepts standard *Porter-Cable*-style bushings. Once the jig is assembled and your router table is ready, you can start making joints.

STEP-BY-STEP. Working with the jig is pretty easy if you follow a few basic guidelines. The jig includes a detailed instruction book that steps you through the process, so I'll just give you the highlights and a few pointers.

Your first step is to make sure your workpieces are the correct thickness. If you're making drawers, it's okay to have thinner drawer sides, but the drawer fronts for some of the larger joints need to be at least ¾" thick. For instance, the crown joint shown in the margin photo is approximately ⅝" tall. You can see how the joint wouldn't fit on the edge of a ½" workpiece.

ROUTER BIT. There's just one more thing to mention before you turn on your router. The router bit included with the jig is a specially made, high-speed steel bit. You won't be able to pick one up at the local hardware store, so you might want to have an extra bit on hand just in case you need it.

PRACTICE JOINTS. You'll want to make some test cuts to get a feel for the jig. My first joints were a little loose and had some tearout. But after I made a few more test cuts, I found the jig to be extremely accurate. That's when it all came together for great-looking joints.

AVOIDING TEAROUT. Because there are so many intricate details with some of these joints, it's not unusual to experience tearout on the edges of the workpieces. For example, on the lock and arrowhead joints (right photos), I noticed that as I moved the bit out of the indented part of the male portion of the joint, the protruding edge would chip. Rout slowly around the details to avoid this tearout.

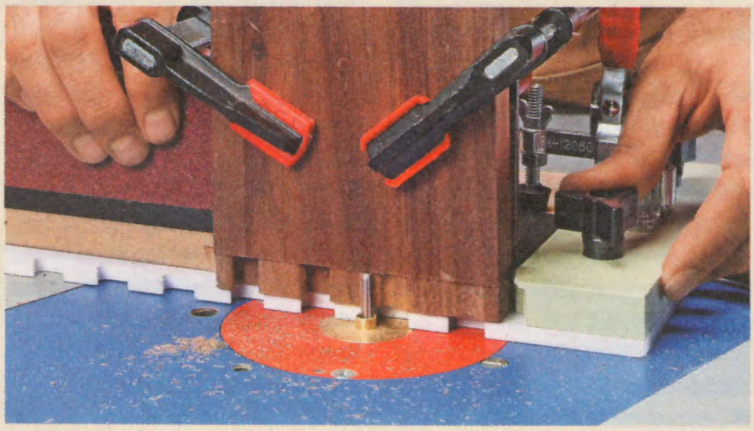
Tearout at the edges of a workpiece may also be a problem when you're routing the male side. You can backrout (move the workpiece in the same direction as the spinning bit) on the end of the workpiece to cut down on tearout. Again, if you take a small bite on the workpiece, you won't have any trouble backrouting.

CLEAN ROUTING. Besides tearout, there are just a couple other issues to be aware of. Like any dovetail jig, the *Fast Joint Jig* creates a lot of chips. And the template has a tendency to collect these woodchips and dust in the recesses where the bushing rides. So be sure to clean out the templates (I used an air compressor) before you make the final pass on the router table.

BLIND ROUTING. I didn't find much about the jig design that caused me concern. But one thing to point out is that sometimes you're routing blind. So you can't really see the results of your work until you lift the jig off the table. If you're working with a large workpiece, this could be a challenge.

ROUT SLOWLY. I also had one mishap with the bit. It broke after making just a few test joints. I'm pretty sure this was due to trying to take off too much material in one pass. After I started taking smaller bites with the router, I didn't break any more bits.

Overall I like the jig. It makes tight-fitting decorative and traditional joints with ease. And for about the cost of a conventional dovetail jig you can make joinery in a variety of patterns on workpieces of different thicknesses. That makes this a worthwhile tool for your shop. W



▲ Routing the "female" side of the joint, which is usually placed in the drawer front, is done with the workpiece clamped vertically in the jig against the fence.

Dovetails, Too!

The *Fast Joint Precision Joinery System* creates dovetails using a set of templates just like the other joints. A dovetail bit is included with the jig .

You'll rout each side separately, like the other joints. And the templates help you get a precise fit for dovetail joints just as easily as any dovetail jig.

▲ Half-blind and through dovetails are a snap with the *Fast Joint* jig.

▼ Additional templates are available to create these and other joints for about $20 each.

12 tips & tricks for perfect Dovetailed Drawers

Here's an easy-to-follow checklist that will guarantee your foolproof dovetail jig won't make a fool out of you.

A dovetail jig and a router make building drawers with half-blind dovetail joints a sure thing — assuming everything works the way it's supposed to. However, in the real world a dovetail jig can prove to be a bit finicky. And this sometimes makes routing dovetails an exercise in frustration.

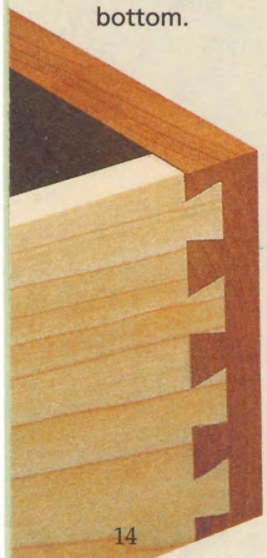
But like every woodworking operation, ensuring success is simply a matter of knowing what can go wrong and how to avoid or fix the problem. Every dovetail jig is a little bit different, but there are some universal tips, tricks, and guidelines that guarantee you'll get the perfect-fitting dovetail joints you're after.

SIZING & SPACING. When planning your project, it's important to think ahead and size the height of the drawer openings and drawers to match the template spacing of your jig. The two most common spacings are on 7/8" and 1" centers. The goal is to end up with a half pin (or close to it) at the top and the bottom (margin photo). For example, if your jig uses a 1" spacing, the height of the drawers should be in even increments of 1".

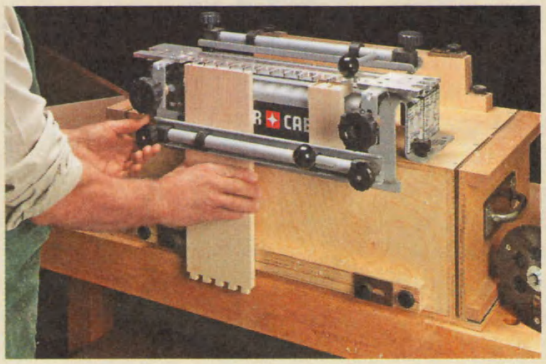
ACCURATE PARTS. You won't get nice-fitting joints or drawers if you start with inaccurate or inconsistent parts. So always make sure your workpieces are flat, square, and uniformly sized.

EASY ACCESS. I like to position the jig at a comfortable working height and make sure it's clamped down tightly (photo below). You'll also find it's advantageous to work at a height that gives you a clear view of the cut. Finally, eliminate any clutter in the work area that might snag the router's power cord.

A CENTERED BUSHING. The jig's template and the bushing in the router base work together to guide the router and bit. If the bit isn't perfectly centered in the bushing, the cuts may not be consistent. So it's a good idea to center the bit before getting started.



▼ Plan the height of the drawers to accommodate a half pin at the top and bottom.

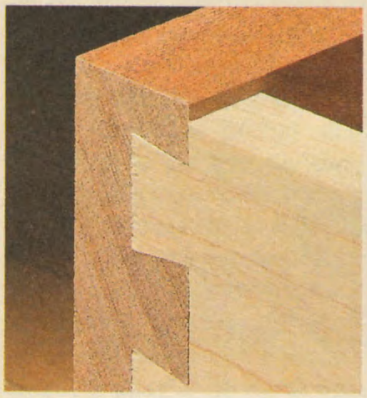


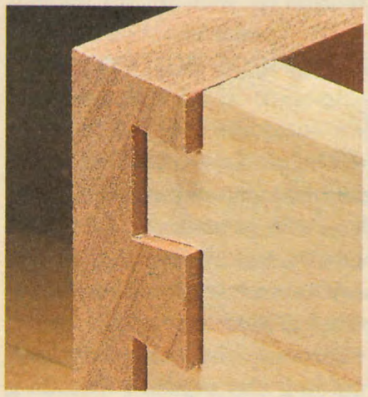
◄ Position the dovetail jig at a height that gives you easy control of the router and also allows you to view the scene of the action.

Actually, since the bit is fixed in the collet, what you're doing is centering the bushing around the bit. This can be done easily with an inexpensive centering cone as shown in the photo at right.

SECURELY CLAMPED. You never want the workpieces to shift while you're routing the joint. So it pays to make sure they're held firmly beneath the clamping bars. If your jig doesn't have grip tape on the clamping bars, consider adding some adhesive-backed sandpaper to create a non-skid surface. And when clamping narrow parts, I place a spacer under the clamping bars to keep them from racking (main photo, opposite page).

BIT HEIGHT. The fit between the pins and tails is determined by the bit height in the router. This is your main adjustment when setting up to cut the dovetails. So the first thing I do is adjust the bit height with test cuts using stock identical in thickness to that of the drawer parts.





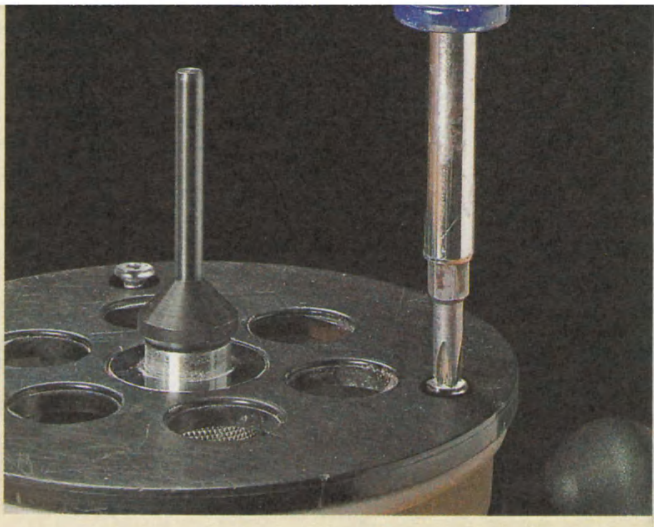
▲ Misaligned edges or surfaces can be avoided with careful setup and adjustment.

If the fit of the joint is too tight, you'll need to lower the bit. The bit will then cut narrower tails and wider sockets. Too loose, and you should raise the bit to produce the opposite effect. I rely on a simple verse to help me remember which way to go, "Lower to loosen — heighten to tighten."

A GOOD FIT. It's always hard to know when the fit is just right. I shoot for a joint that can be assembled with only moderate pressure. You should be able to fit the tails halfway into the sockets by hand. Then a few light taps with a mallet should fully seat the tails (lower right photo).

SCORING PASS. It's not uncommon to experience minor tearout along the inside edge of the tail piece. This can be avoided by starting with a light scoring pass across the front of the workpiece traveling from right to left (main photo, opposite page). Backrouting this shallow shoulder will eliminate the chance of tearout when making the full-depth cuts.

BACK & FORTH. When following the fingers on the subsequent pass, I work on keeping the router flat on the template. Since only half of the router's base is supported by the template, the trick is to concentrate on keeping its weight balanced. And then once the first left-to-right pass is completed, I like to make a second right-to-left "insurance" pass to be certain that all the sockets and tails are cut to full depth.

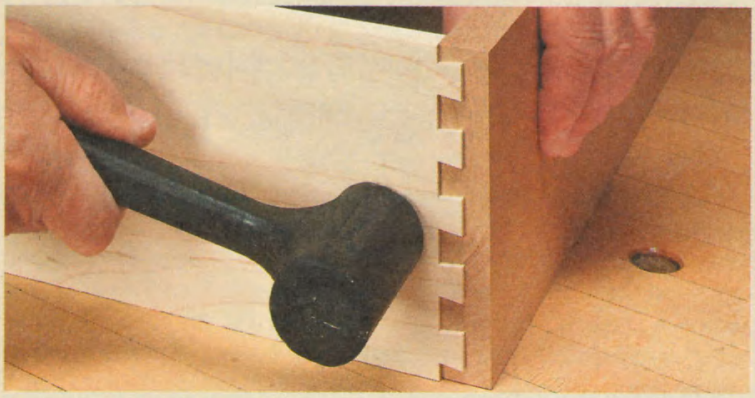


▲ Installing the bushing and baseplate with a centering cone will ensure the bit is perfectly centered.

FLUSH EDGES. Even when the pins and tails fit well, the edges of the pieces may not align (upper left photo below). The cause? One piece was not snug against the stop. The simple cure is to check the position of both workpieces before turning on the router. They should be tight against the stop as well as snug to one another and the template.

IN OR OUT. You can encounter a similar problem where the sides aren't flush (proud or recessed) with the front and back. The fix here is to adjust the depth of the sockets by moving the template or stop bar forward or back.

NO CLAMPS. Since dovetails form a locking joint, relying on clamps at assembly is optional. My choice is to leave the clamps in the rack. It's less stressful and it's easier to square up the drawer. Just apply glue sparingly to the sides of the tails and sockets, tap the joint flush, and finally, check for square on a flat surface. W



▲ You want to shoot for an easy-to-assemble fit between the pins and the tails. It shouldn't take more than a few light taps with a mallet to seat the tails flush with the pins.

classic Entry Bench

Mortise and tenon joinery, a sculpted seat, and curved legs combine to make this bench an elegant addition to your home.

A bench is a great addition to an entryway or hall in your home. It also creates a comfortable place to cozy up by the fireplace or as a dressing seat at the foot of the bed. It's really a versatile piece of furniture in any home.

This bench will grace any area with style, too. The sculpted seat and wedged, through tenons add to the attractiveness of the bench. In addition, the splayed legs and curved rails and stretchers create eye-catching lines on the base.

Even with the angles and contoured seat, the bench isn't complicated to build. The legs are easy to cut on the table saw with a simple shop-made jig. And another easy-to-build jig guides a router to form the contoured seat. Plus, it's all done with power tools. This eliminates a lot of involved handwork, so you can have this bench completed in short order.

The only difficult part about building the bench is deciding where it will be located, because you'll want to show off this impressive bench.

making leg TENONS

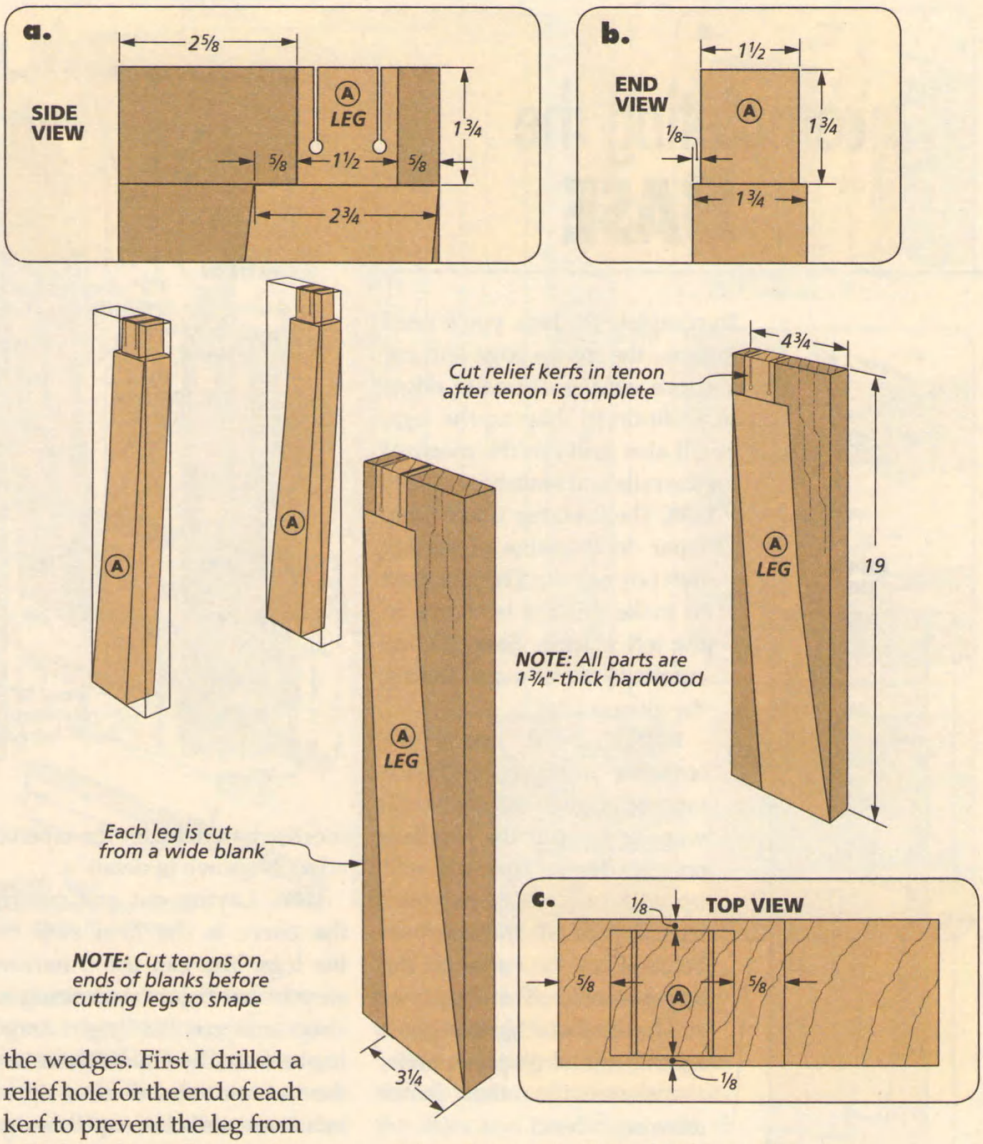
You'll start on the bench by making the four tapered legs. The legs are mortised to accept the rails and stretchers, and a tenon is cut on the top of each leg to fit through mortises in the seat.

TENON FIRST. I cut each leg from a wide, rectangular blank. Your first step is to cut the tenons on the end of the leg blanks, as shown in detail 'a.' Because of the curved shape of the leg, the tenon at the top is offset. After the leg is cut to shape, the tenon will be centered.

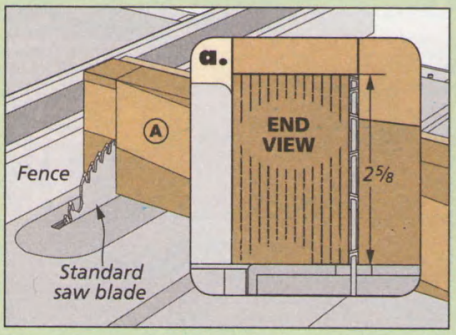
To create a clean shoulder at the top, I first scored all four shoulders of the leg with a standard blade, as shown in the How-To box below. (You'll need to adjust the blade height for each side.) The shoulder on the curved side of the leg is too deep to cut with a dado blade, so you'll need to make a series of cuts on the table saw and clean up the cheek with sandpaper. Then you can finish up the tenon with a dado blade, as shown in the center drawing in the box below.

RELIEF KERF. There are just a couple more steps to complete the tenons. Later, when you attach the seat to the base, you'll use wedges to lock the tenons in the mortises. So you'll need to cut the kerfs now for the wedges. First I drilled a relief hole for the end of each kerf to prevent the leg from splitting when the wedge is added. The holes also act as glue catches at the bottom of the wedge. You can locate the relief holes in the tenons, as shown in the right drawing below. Then lay out the lines for the relief kerfs. Finally, cut them on the band saw (drawing below).

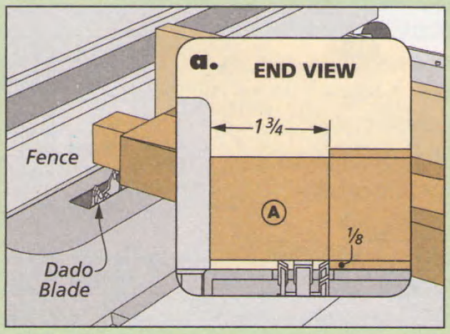
With the tenons complete, your next step is to finish up shaping the legs and drilling out the mortises.



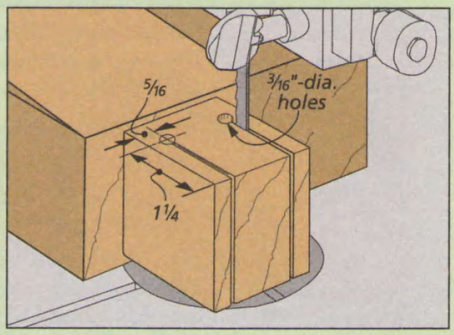
How-To: Cut the Tenons



Tenon Cuts. *The tapered side of the leg requires deep cuts, so use a standard blade to make multiple cuts, removing the waste.*



Finish the Tenon. *The remaining three sides of the tenon can be cleaned up with a dado blade. Use the rip fence as a stop.*



Relief Kerfs. *Use a band saw to make two kerfs in the end of the tenon. During assembly you'll insert wedges in the kerfs.*

completing the BASE

To complete the legs, you'll need to taper the inside edge and cut a curve on the opposite edge. In addition to shaping the legs, you'll also drill out the mortises for the rails and stretchers.

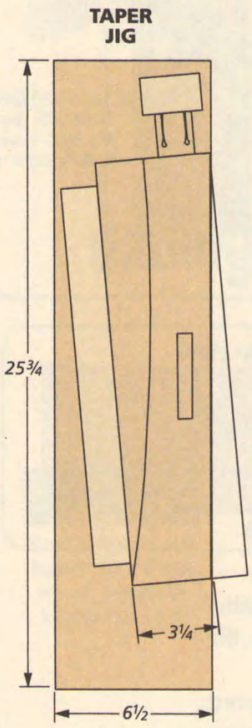
TAPER. The first step is to cut the taper on the edge of the leg (left box below). The jig I used to make this cut is shown in the left margin. Save the leg cutoffs to use as a caul during the glueup later.

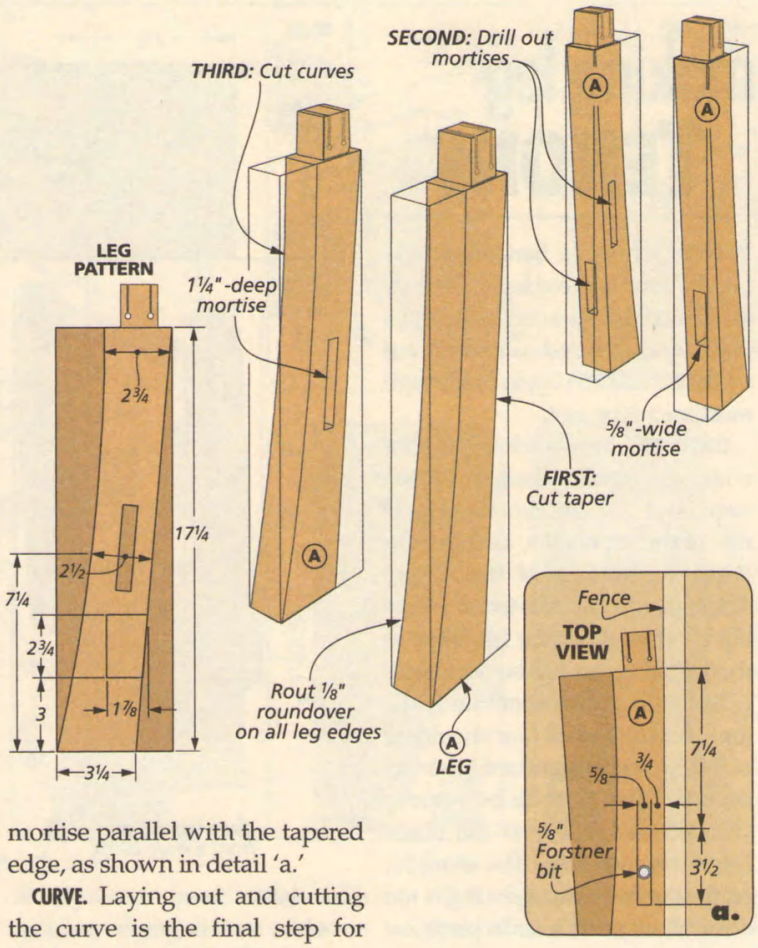
MORTISES. Next up is the stretcher mortise on each tapered edge of the leg. You'll want to lay out the mortises on each leg so that you end up with two sets of mirrored legs. I formed the mortises before I cut the curve on the opposite edge. This way, you still have a flat edge to register against the drill press table, as shown in the center drawing below.

When the stretcher mortises are complete, it's time to cut the mortise on the face of the leg for the rails. This time you'll lay the tapered edge of the leg against the drill press fence. This will automatically keep the mortise parallel with the tapered edge, as shown in detail 'a.'

CURVE. Laying out and cutting the curve is the final step for the legs. You can use a narrow strip of hardboard and string to strike a layout line (right drawing below). Then make the cut on the waste side of the line at the band saw and clean up the edge with a sanding drum.

Once the legs are shaped, round over all the edges on the router table. I like to do this on the bottom edges of the legs, too. This way if the bench is moved, the legs won't chip.



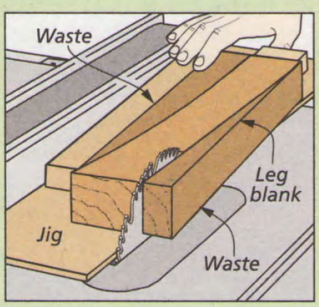


RAILS & STRETCHERS

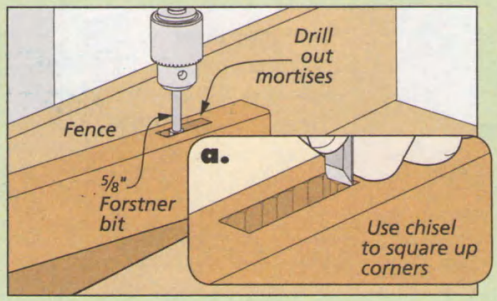
Each pair of legs is attached to a rail to make an end section. Although the rails sit at a slight angle, they're cut square. Likewise, the tenons are cut square.

RAIL. Since the tenons on the rails are pretty straightforward, I went ahead and installed a dado blade to cut them. Use the rip fence on your table saw as a stop to size the tenon.

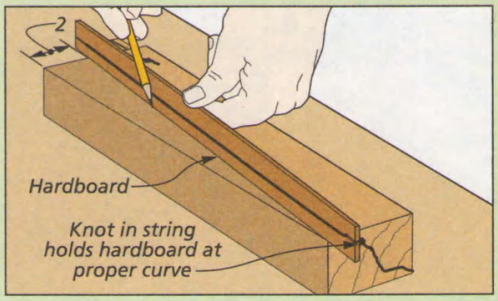
How-To: Shape the Leg



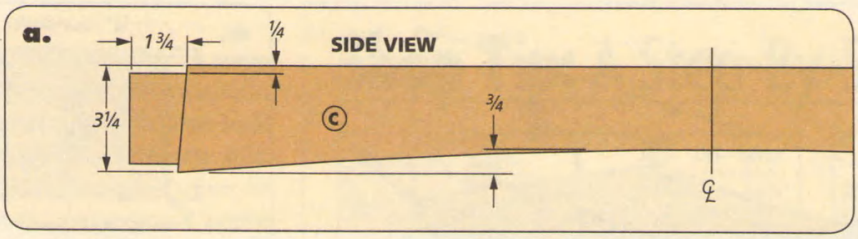
Taper Cut. *Use a taper jig (above) to cut a taper on the inside edge of each leg.*

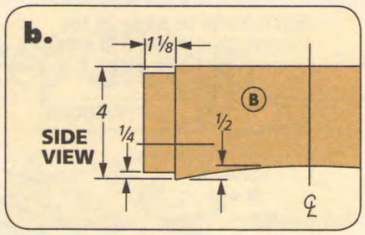


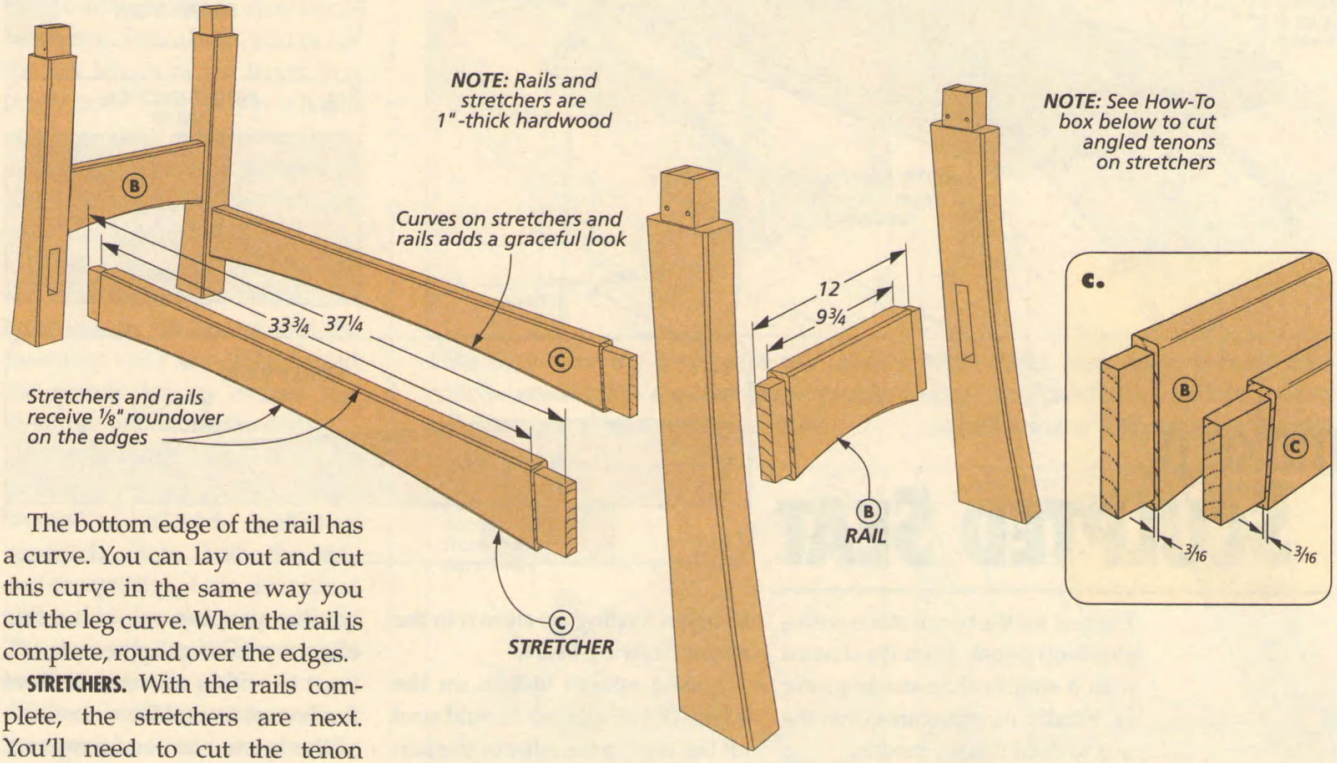
Drill Mortises. *Drill out the mortises for the stretchers in the tapered edge of the leg. Then clean up the sides with a chisel.*



Cut Curve. *Use a narrow strip of hardboard and a string to lay out the curve on the outside edge of the leg. Cut it on the band saw.*







The bottom edge of the rail has a curve. You can lay out and cut this curve in the same way you cut the leg curve. When the rail is complete, round over the edges.

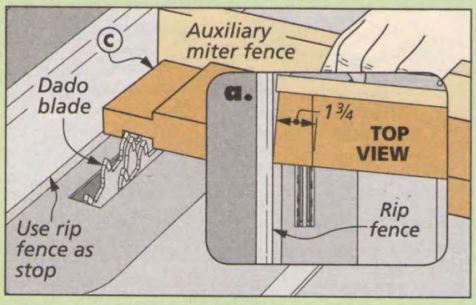
STRETCHERS. With the rails complete, the stretchers are next. You'll need to cut the tenon shoulders on the stretchers at 5° to match the splay of the legs, as shown in the box below. I started by cutting the stretcher to overall length and width. To cut the cheeks of the tenon, follow the step in the left drawing below. Then flip the workpiece and angle the miter gauge in the opposite direction to cut the other cheek.

As you can see in the center drawing, there are two setups for the edge shoulders. You'll need to reposition the rip fence for each cut. The key here is to leave a little bit of waste when making these cuts and then trim the shoulders back with a chisel.

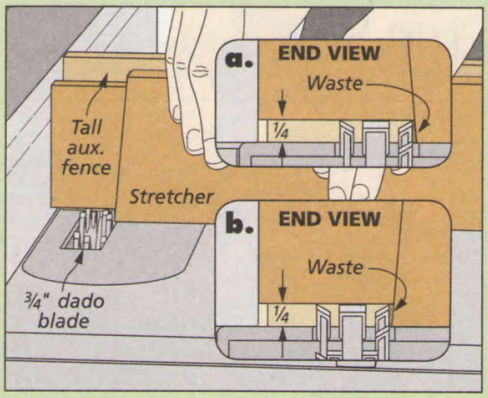
To finish up the stretcher, cut the curve on the lower edge. Then round over all the edges.

ASSEMBLY. With the workpieces completed, it's time to get busy assembling the base. To create two end sections, I glued each rail to a pair of legs. Then I connected the end sections with the stretchers, using the waste from the curved cuts earlier as cauls to hold the clamps during the glueup. When the glue is dry, you can start on the seat.

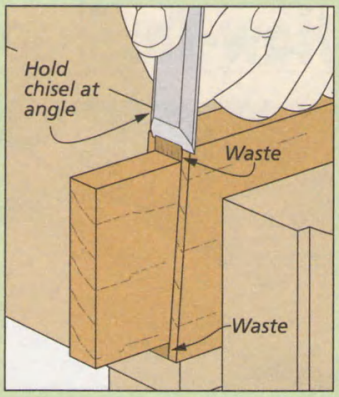
Angled Tenon



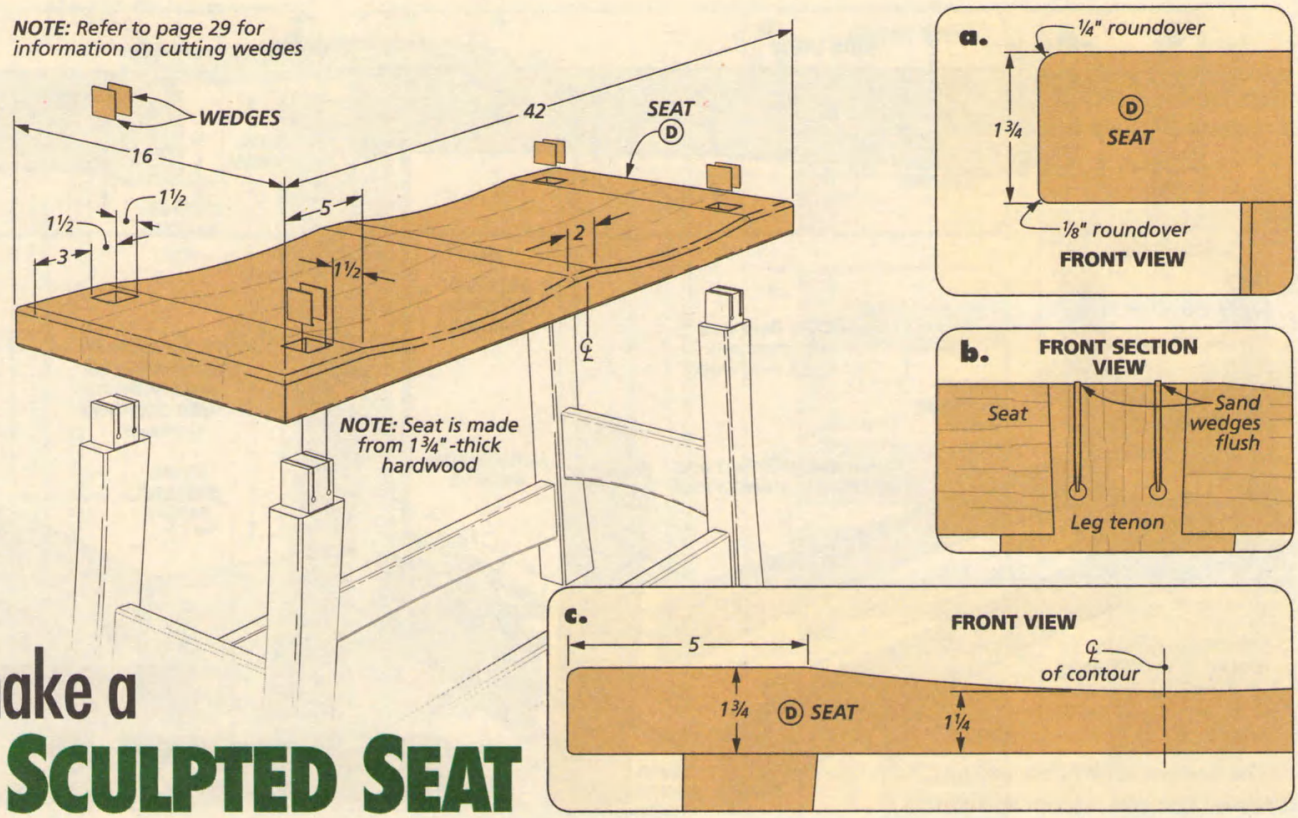
Stretcher Tenon. *Set the miter gauge at 5° to cut the first cheek. Without moving the rip fence, reverse it to cut the other cheek.*



Edge Shoulder. *Set the saw blade at 90° for the edge shoulder cut. Make the cuts just a little shy of the cheek cut.*



Clean Up. *Use a sharp chisel to clean up the edge shoulder to meet the cheek shoulder.*



make a SCULPTED SEAT

The seat for the bench starts with a glued-up panel. Then it's shaped with a simple shop-made router jig. Finally, mortises are cut in the seat to hold the leg tenons.

CONTOURS. When the seat is cut to size, you can start to work on the seat contours. Use the shop-made jig shown on page 28 with a router to sculpt the seat. The step-by-step process of routing each end of the seat is shown in the How-To box below.

To get started, mark layout lines for the contoured area on the seat (detail 'c'). Then set up the jig to begin routing, as shown in the center drawing below.

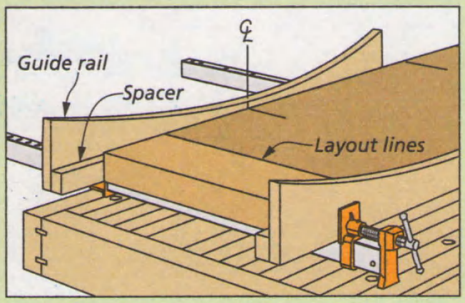
I used spacer blocks on the edges of the seat, so I could rout all the way to the edge of the seat and avoid routing into the guide rails. You'll rout one end of the seat at a time, removing small amounts of material with each pass (right drawing).

The router will have a tendency to pull into the waste as you rout in one direction and away from the waste when you push the router in the opposite direction. If you find the router hard to handle, you can minimize this effect by taking lighter passes. Rout to within about an inch of the layout lines. When the bulk of the waste has been removed, make a few light passes to sneak up on the layout lines. Repeat the process on the opposite end of the seat. Finally, sand the entire seat, blending in the edges with the seat contour and smoothing the surface with a soft sanding block.

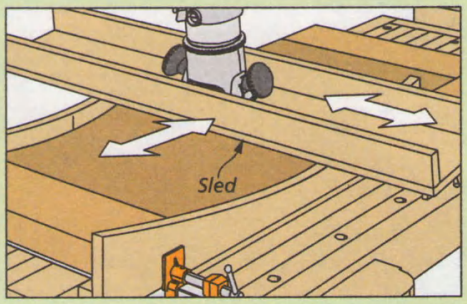
POSITION MORTISES. As I mentioned, the seat is attached to the base with wedged tenons in through mortises. To locate the mortises,

How-To: Shape the Seat

Shop-Made Router Jig. *You'll find details on the jig I used to shape the seat on page 28.*



Set Up the Jig. *Align the center of one side of the seat with the guide rails, add the spacers, and clamp them to the seat.*



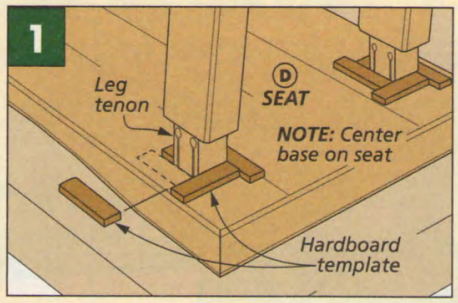
Using the Jig. *With the bit set to take a light cut, let the router come up to full speed and then ease into the cut.*

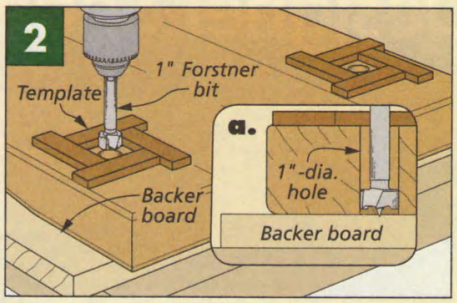
place the seat upside down on the workbench and center the base on the seat. Because the seat is large and heavy, I came up with a technique to use a hand-held router to cut the mortises (right drawings).

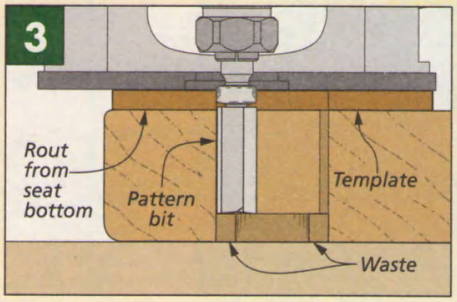
I attached strips of hardboard around each tenon with double-sided tape, as shown in Figure 1. These strips act as a template when cleaning the side of the mortise with a flush-trim bit and a pattern bit.

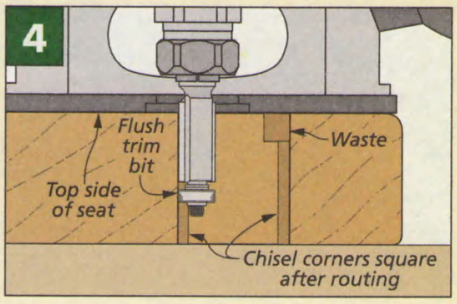
With the template strips in place, you can drill out the center of the mortise with a hand-held drill (Figure 2). You'll need to place a scrap piece under the workpiece to act as a backer. Once the hole is drilled, use a pattern bit to remove the waste up to the template on the underside (Figure 3). To continue, flip the seat over and use a flush-trim bit to remove the waste on the top side (Figure 4). The round corners left by the router can be cleaned up with a sharp chisel.

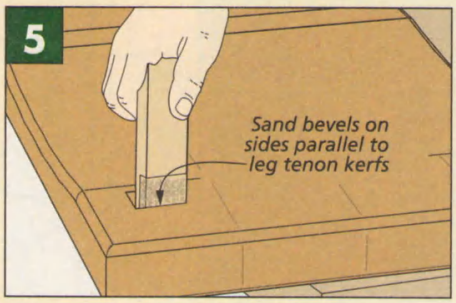
BEVEL. The final step in creating each mortise is to sand a slight bevel on two sides of the mortise to allow the tenon to splay out as the wedges are driven in. You want to bevel the two sides that are parallel to the wedge kerfs you cut earlier in the top of the leg tenons. You don't have to remove much material. I just sanded the sides with some 60-grit sandpaper and a narrow sanding block (Figure 5).

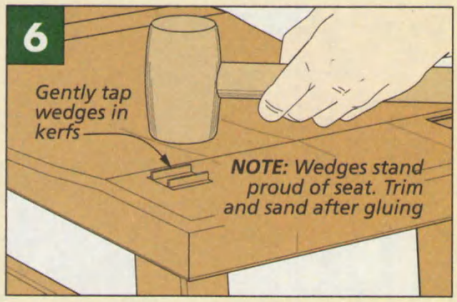












WEDGES & ROUNDOVERS. Before you attach the legs to the seat, there are two things you need to do. First, you'll need to cut wedges for the tenons (refer to page 29). Then you'll want to rout the roundovers on the top and bottom of the seat. This is much easier to complete before you assemble the bench.

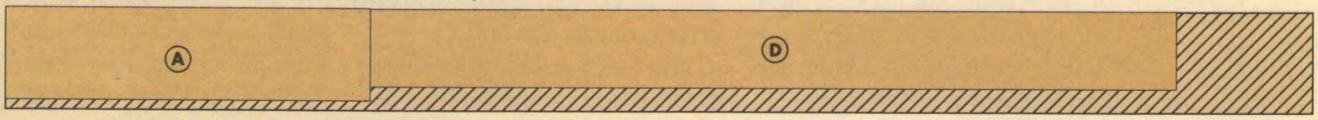
ADD THE SEAT. When you've completed the roundovers, glue the seat to the base through the mortises, spread some glue in the kerfs, and drive the wedges in place (Figure 6). When the glue is dry, you can trim the wedges and sand everything flush with the seat.

Once you've applied the finish (refer to Sources on page 51), you can find a prominent spot in your home to show off your new classic-style bench. W

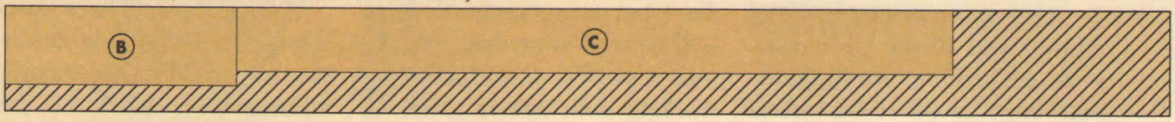
Materials & Cutting Diagram

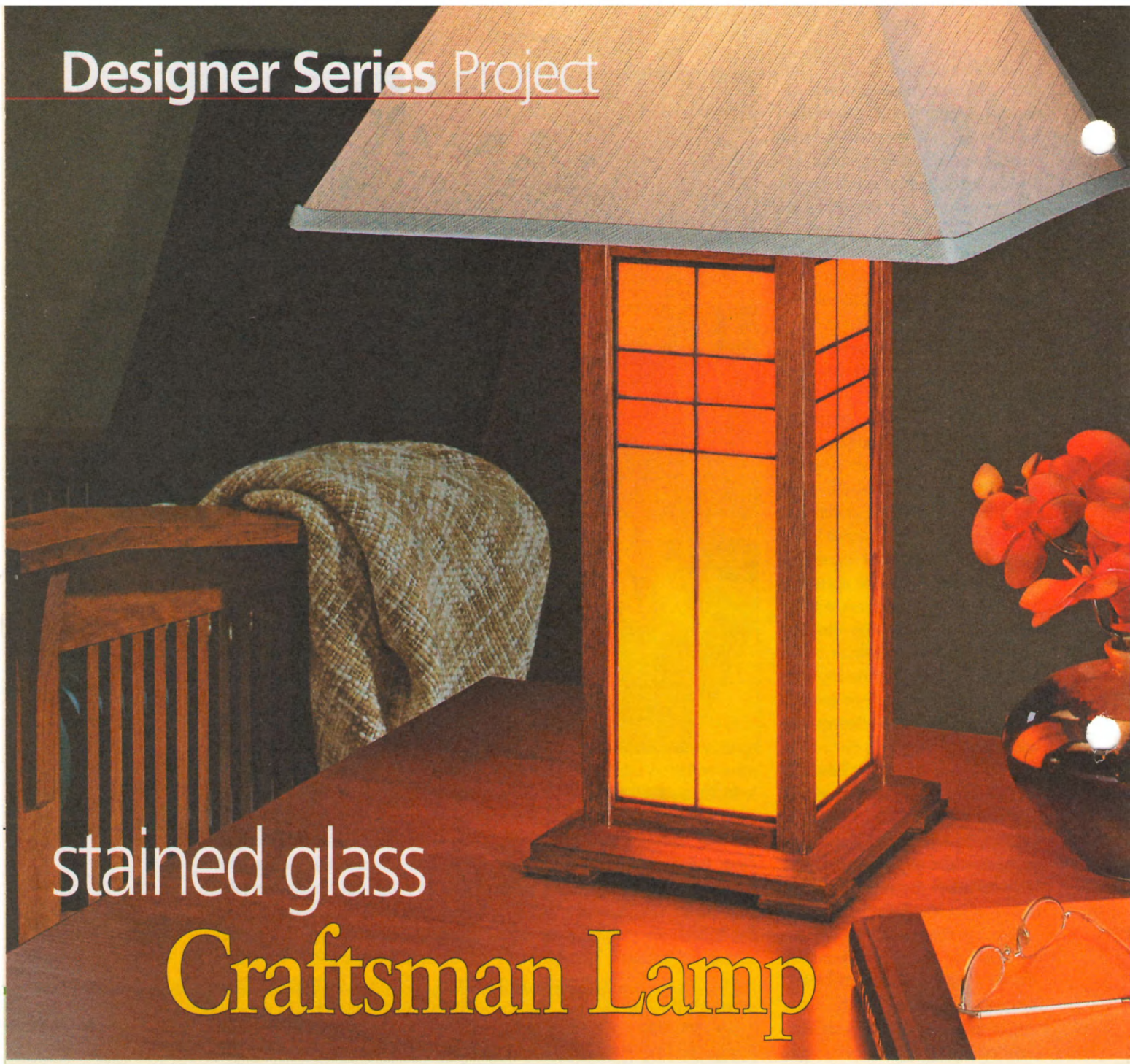
A	Legs (4)	$1\frac{3}{4} \times 4\frac{3}{4}$ - 19	C	Stretchers (2)	$1 \times 3\frac{1}{4}$ - $37\frac{5}{16}$
B	Rails (2)	1 x 4 - 12	D	Seat (1)	$1\frac{3}{4}$ x 16 - 42

$1\frac{3}{4}$" x 5" - 72" Oak (Four boards @ 5 Bd. Ft. each)



1" x 5" - 60" Oak (Two boards @ 2.6 Bd. Ft. each)





stained glass Craftsman Lamp

Words like "timeless" and "classic" get thrown around a lot when describing furniture. In this case, they're both appropriate.

A good lamp can do a lot more than light up a dark room. It can help define the style and function of any space in your home.

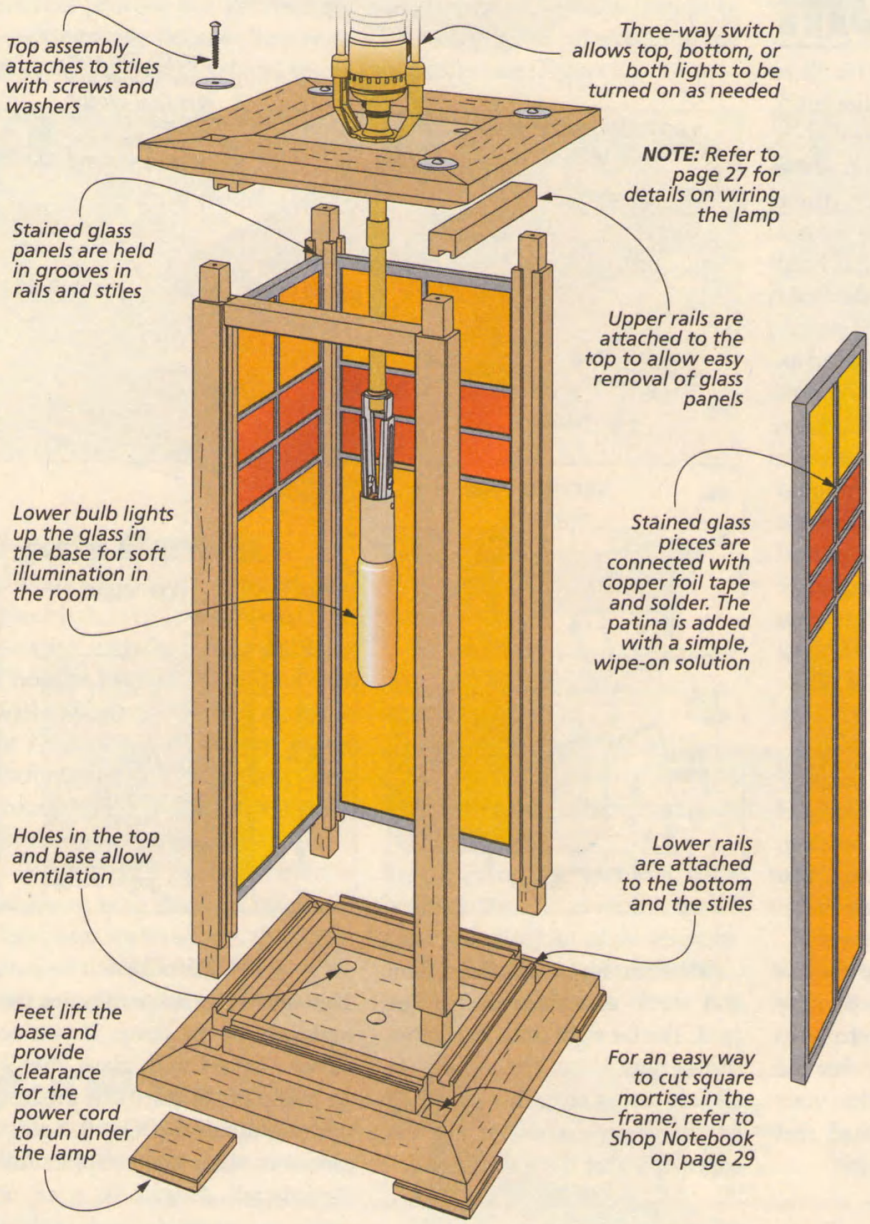
The stained glass lamp shown above does exactly that. The signature lines of the Craftsman style are evident throughout. Each panel of the stained glass base is framed with oak. The feet and base are typical of Craftsman-style furniture, as well.

Whether you're a beginner or an old hand at woodworking, this is a great project. It's not too difficult, but your attention to detail will be well-rewarded. And it's also a perfect introduction to working with stained glass. All the cuts are straight lines, and I've used a very simple soldering technique to assemble the panels. Even the wiring is very straightforward. I'll take you through the whole process, step by step.

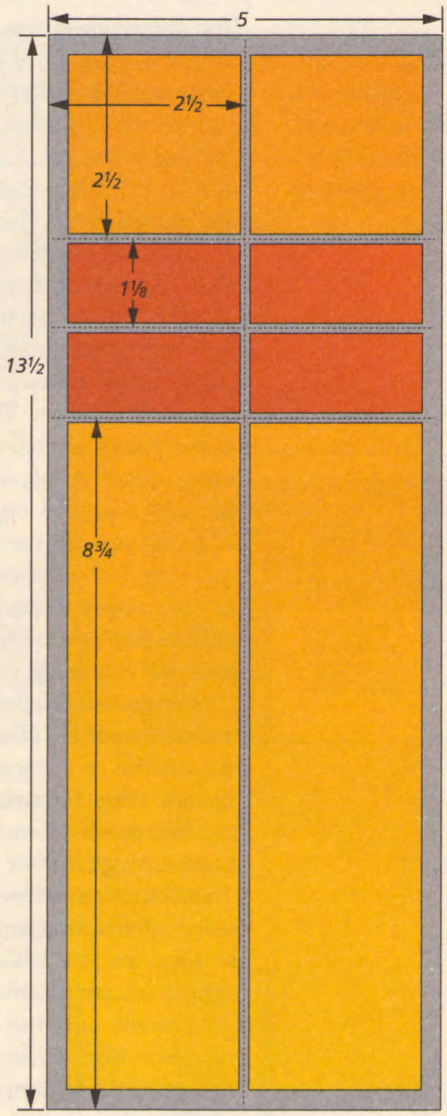
In the end, you'll have learned a few new techniques. But better still, you'll have a beautiful addition to your home. A timeless classic if there ever was one.

CONSTRUCTION DETAILS

OVERALL DIMENSIONS: 8¼"W x 8¼"D x 16½"H (without shade); 27"H (with shade)



FRONT VIEW

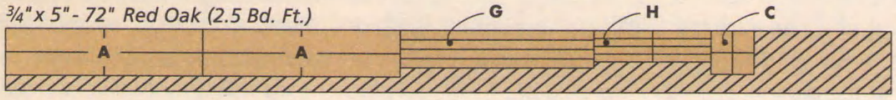


Materials, Supplies & Cutting Diagram

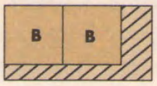
A	Top/Bottom Frame Pieces (8)	¾ x 1⅞ - 8
B	Frame Panels (2)	¼ ply. - 4¾ x 4¾
C	Feet (4)	⅜ x 1¾ - 1¾
D	Top Glass Panels (8)	¼ glass - 2½ x 2½
E	Center Glass Panels (16)	¼ glass - 2½ x 1⅛
F	Bottom Glass Panels (8)	¼ glass - 2½ x 8¾
G	Stiles (4)	¾ x ¾ - 15¾
H	Rails (8)	½ x ⅝ - 4¾

- (1 roll) ¼" Copper Foil Tape
- (1 roll) 60/40 Solder
- (1 Bottle) Flux
- (1 Bottle) Patina
- (1) Three-Wire Socket
- (1) Candelabra Base Socket
- (1) 35W Tubular Bulb
- (1) Brass Neck
- (1) 3" Brass Nipple
- (1) 4" Brass Nipple
- (1) Brass Coupling
- (1) Brass Hexagon Lock Nut
- (1) 18-gauge Lamp Cord (8'-long)
- (1) Harp
- (1) Shade
- (4) #6 x 1" Rh Woodscrews
- (4) 5/32" x ⅞" Fender Washers
- (1) 22-gauge Lamp Cord (12"-long)

¾"x 5" - 72" Red Oak (2.5 Bd. Ft.)



¼"x 6" - 12" Red Oak Plywood



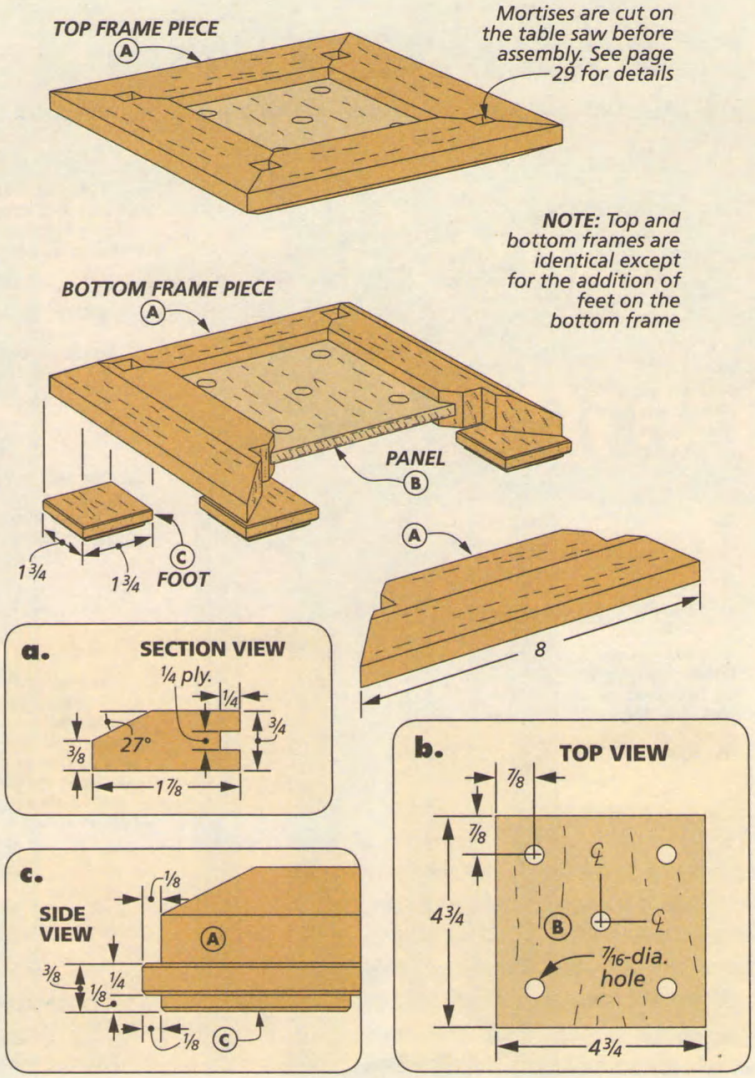
making the TOP & BOTTOM

The stained glass base of the lamp is sure to get a lot of attention. It starts with two identical frames, one on the bottom, the other serving as the top. These frames anchor the side panels that hold the stained glass. They also hold ¼" plywood panels that the electrical components are mounted to.

FRAMES. I made the top and bottom frame and panel assemblies using the techniques shown in the box below. The mitered frame pieces are beveled on the outer edge. A plywood panel fits into a groove on the inside edge. As you can see in the main drawing, I also drilled five holes in each plywood panel to allow airflow through the base to minimize the heat build up.

One unusual feature is the mortise that holds the stiles. I formed the mortise by cutting a notch in the end of each frame piece. You can find the details in Shop Notebook on page 29.

ASSEMBLY. Assemble the frames using glue and clamps. Be sure to align the notches carefully to form a square mortise. After the glue dries, you can turn your attention to the four small feet that fit on the bottom frame.

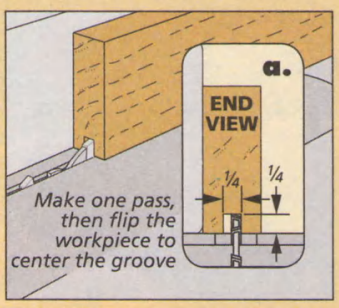


FEET. Four feet raise the frame and make room for the power cord. The far right drawing below shows how to cut the rabbets on all four sides of each foot. Then lightly sand a chamfer on the edges and glue the feet in place.

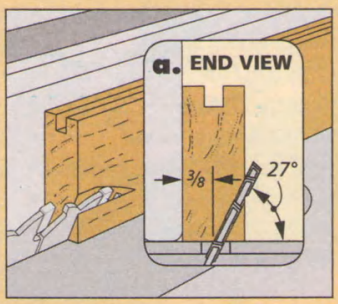
STAINED GLASS

The stained glass panels are the highlight of the lamp. If you've never worked with glass, this is an easy place to start. The process is straightforward: Cut the glass pieces to size, wrap copper foil

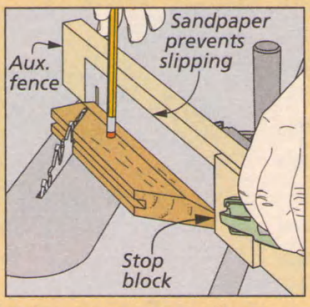
How-To: Make the Frames & Feet



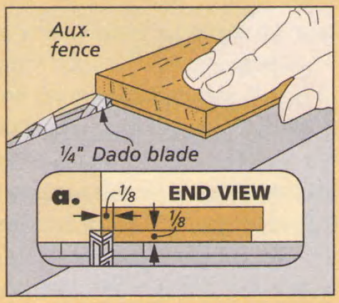
Notch. *Start shaping the frame pieces by cutting a centered groove for the plywood panels.*



Bevel. *Now you can cut the decorative bevel on the outside edge of the pieces.*



Miter. *An auxiliary fence on the miter gauge makes cutting accurate miters a snap.*



Feet. *With most of the blade buried in an auxiliary fence, cut the shallow rabbets on the feet.*

tape on the edges, flux the tape, and solder them together. Sources on page 51 has information on finding the materials you'll need.

GETTING STARTED. The step-by-step instructions at right walk you through the process of making the panels. I made a simple jig with stops on the top and left edges to help keep the panel square while you cut and assemble the pieces (Step 1). Also, take a minute to identify the inside and outside faces of the glass. (The shiner face is the inside.)

WORKING WITH GLASS. Using a glass cutter to score the glass can take a little practice. I made a few practice cuts to get started, then cut the first panels to size. Keep a straightedge on the workpiece to steady the cut. Then use a quick snapping motion to break the glass along the scored line.

Steps 2 and 3 show how to wrap the tape around the edges and burnish it in place. Remember that it's really the tape that will hold everything together, so burnishing is a critical step.

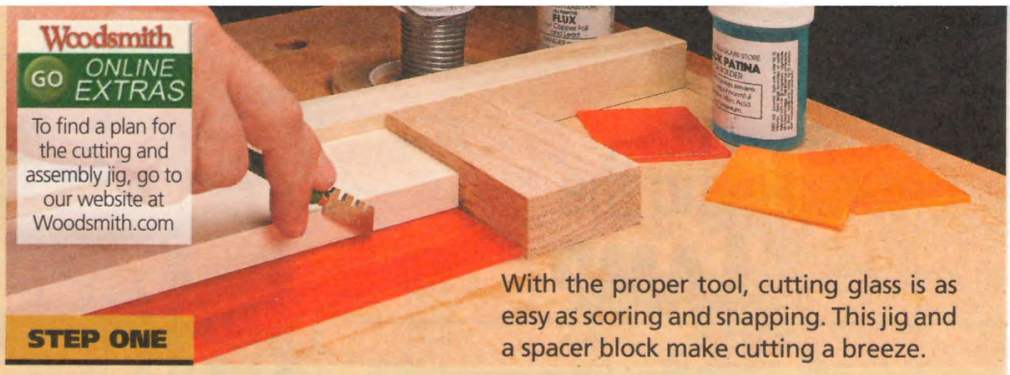
ASSEMBLING THE PANELS. Flux allows the solder to flow easily into joints for a good bond. After brushing flux onto the taped edges, lay out the fully wrapped pieces on your worksurface (Step 5).

Now you can flow the solder into the joints by using the tip of the iron to heat the solder. I found this worked well and allowed me to make a consistent bead on the joints. The key is to keep moving.

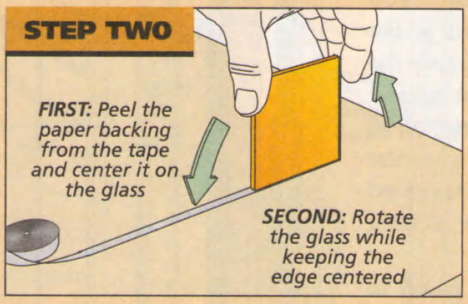
I soldered the inside face first to help develop a good technique. Since this face isn't visible, you can refine your touch here and ensure a better finished product.

After soldering the outside joints, you can add another strip of tape to the outside edges (Step 7). Applying solder to this piece gives the panel a finished look.

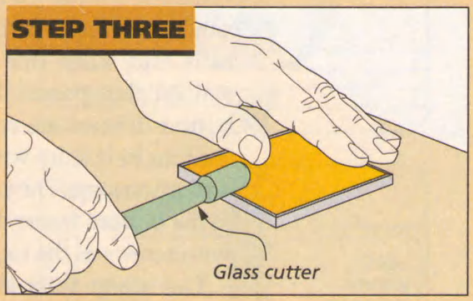
Finally, you're ready for a little cleaning up. Lacquer thinner works well to remove finger oils and flux residue. Then just brush on the patina as shown in Step 8 to darken the solder.



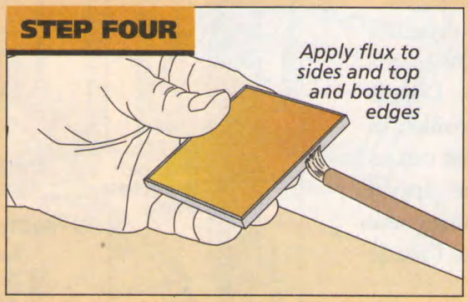
With the proper tool, cutting glass is as easy as scoring and snapping. This jig and a spacer block make cutting a breeze.



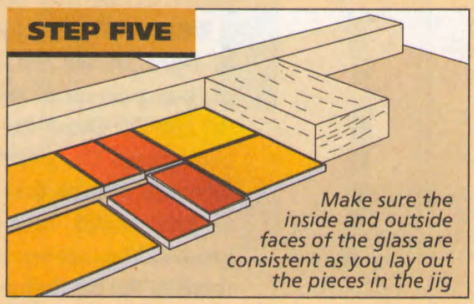
Tape. *Wrap the edges of each piece with the copper foil tape. By using a rolling motion, it's easy to keep the tape centered.*



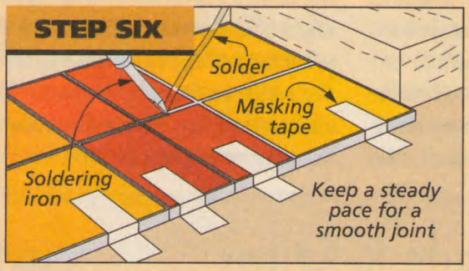
Burnish. *The end of the glass cutter is ideal for burnishing the tape onto the glass. This step fixes the tape to the edge for a solid joint.*



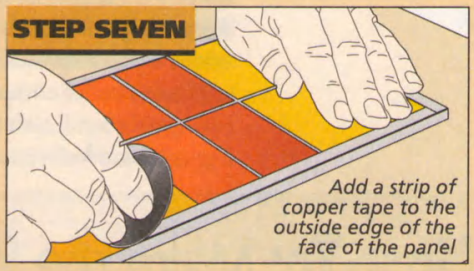
Flux. *Apply the flux with a brush. Be sure to cover all of the copper foil tape to allow the solder to flow into the joint.*



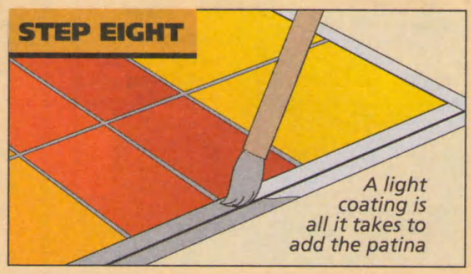
Assembly. *The cutting jig now serves as an assembly platform to hold the pieces in perfect alignment for soldering the joints.*



Solder. *You can rest your hands on the jig to hold them steady as you heat the solder and flow it into the joints. Try for an even bead.*



Tape the Edges. *Now you can add the tape on each edge and solder this piece, before you add the patina (for a uniform look).*



Patina. *After the soldering is complete, brush on a coat of patina fluid. The effect is instant, so you can easily see any spots you miss.*

The finished glass panel looks authentic to the Craftsman style.

completing the LAMP

With the frames complete, you can turn your attention to the rails and stiles that house the stained glass panels. The top and bottom frames are connected to the four long stiles with a mortise and tenon joint. The joint is glued in the bottom frame, but secured with screws at the top.

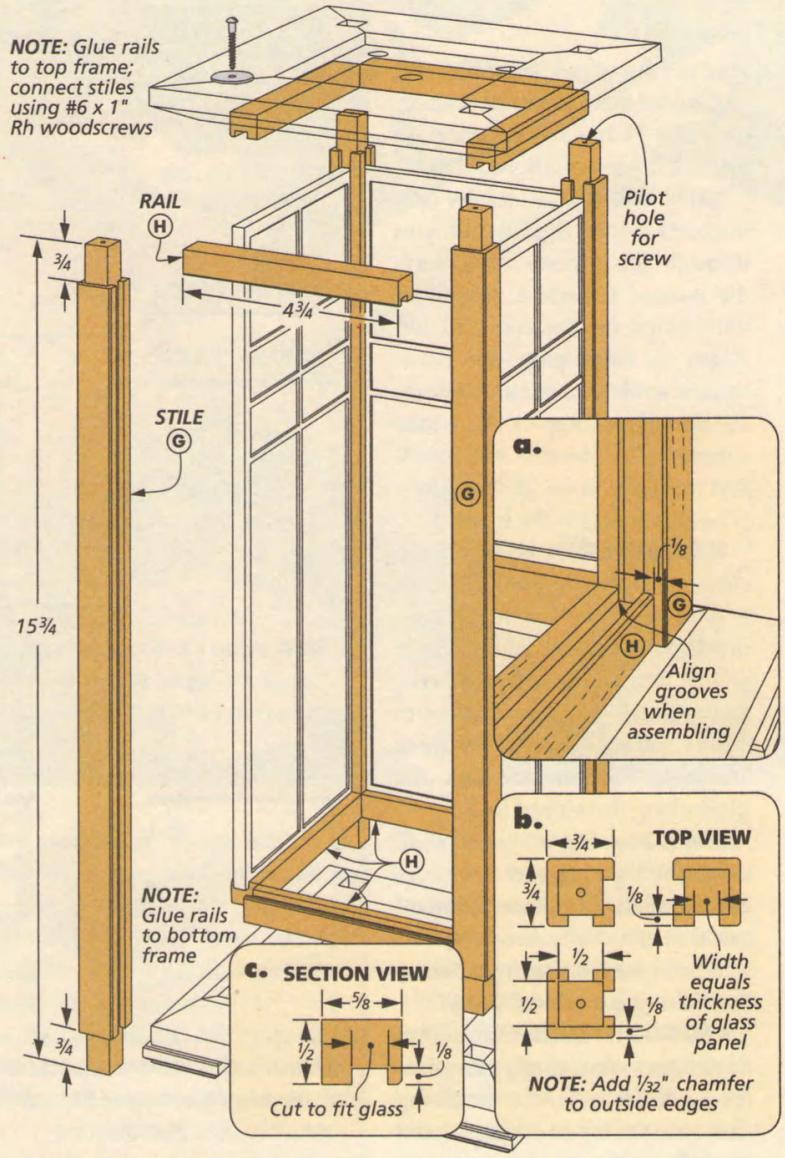
The upper rails are glued to the top only. This allows the top frame to be removed to replace bulbs and access the stained glass panels in case they're damaged.

RAILS & STILES. The main drawing at right shows the dimensions of the rails and stiles. Details 'b' and 'c' show the profiles of each piece. The rails start out as ¾"-wide blanks that are ripped to final width after cutting the groove. You can see how I made them in the box below.

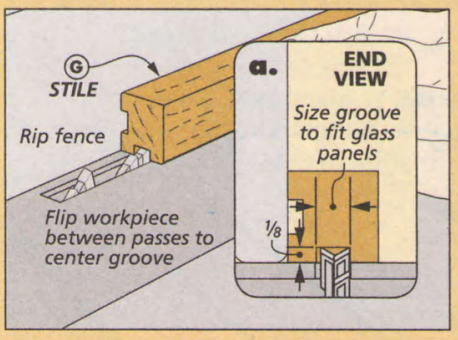
The thing to keep in mind is that the glass panels should slide easily into the grooves. Also, you may need to make the grooves deeper if your panels finish a bit wider than the plan shows.

When you've completed those tasks, you can finish up by drilling centered 3/32"-dia. holes in the ends of the tenons. These are the pilot holes for screws that attach the stiles to the upper frame (far right drawing at the bottom of the opposite page).

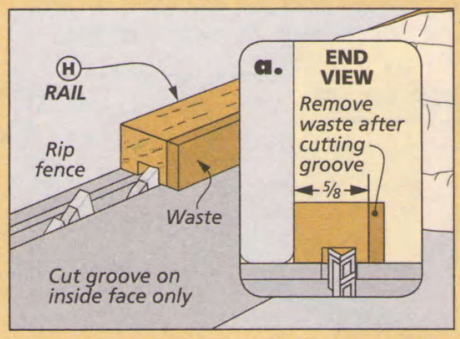
CHAMFER. The outside edges of the stiles and the one outside edge of the rails are chamfered as shown in details 'b' and 'c.' I used a sanding block for this.



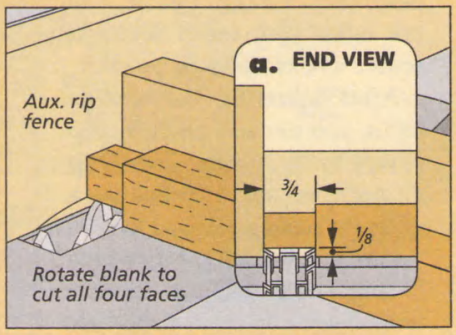
How-To: Make the Rails & Stiles



Make the Stiles. *With a dado blade installed, cut the shallow grooves on two adjacent faces to hold the glass.*



Rails. *Starting with a 1/2" x 3/4" blank, first cut a centered groove, then install a rip blade and rip the blank to final width.*



Tenons. *Install an auxiliary rip fence and use a 3/4" dado blade to cut the tenons on the ends of the stiles.*

It's a good idea to dry fit the entire assembly, including the glass panels. The tenons should fit snugly into the mortises on the top and bottom frames.

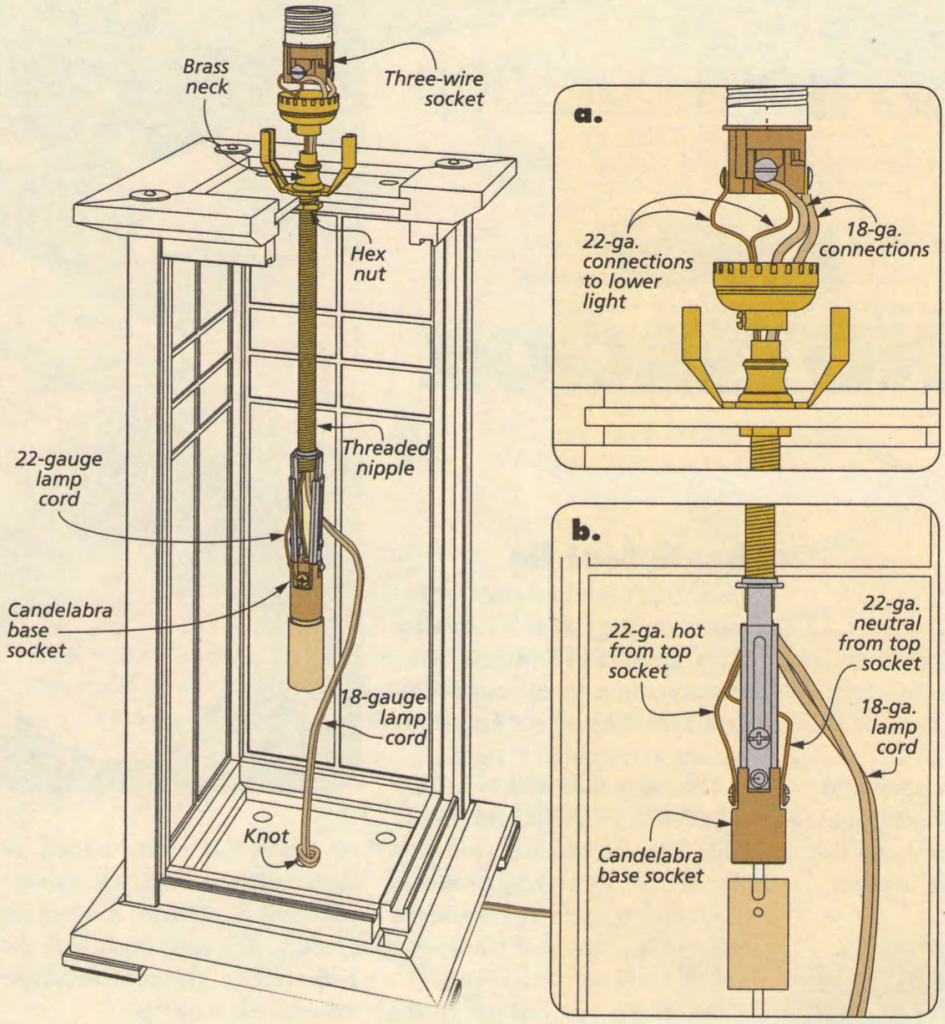
ASSEMBLY. At this point, glue the rails and stiles to the bottom frame (left drawing, below). Next, fit the top in place on the stiles and glue the upper rails to the top frame.

STAIN & FINISH. After the glue dries, you can stain the lamp. Sources on page 51 has the details on the finish I used. Once the stain dried, I added the clear finish.

WIRING. Wiring the lamp isn't too difficult, but if you're uncomfortable, it's probably best to hire an electrician to wire it for you or take it to a lamp store for help.

The unique thing about this lamp is the three-wire switch on the upper socket. This switch controls both the upper and lower lights. The socket has two "hot" leads and a single neutral post. One hot is for the lamp, and the other connects to a separate fixture, in this case the candelabra socket in the base. The drawings at right show the assembly of the lamp parts, as well as the wiring plan.

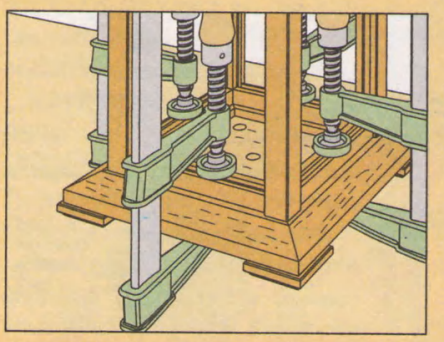
With this type of switch, it's best to "pigtail" the lower socket to the upper one. I used 22-gauge lamp cord to make the connection from the socket to bottom fixture. This way, you simply connect the cord to the upper socket and avoid the need to splice wires.



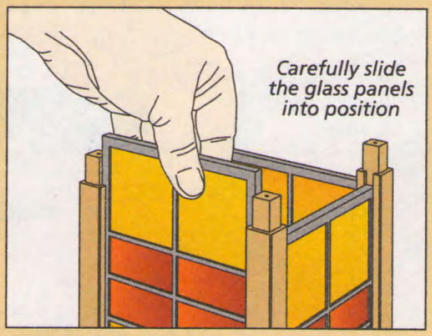
You can start by tying a knot in the 18-gauge cord near the base to prevent it from pulling off the connections. After that, thread the 18-gauge cord and a short length of 22-gauge cord up through the nipple to the three-wire socket. Then, connect the hot and neutral wires to the socket. Now you can attach the 22-gauge wire to the hot post that controls the socket and neutral posts on the socket, as well.

After connecting to the lower socket, test to make sure that all the switch positions work. Then, all that remains is to install the glass panels, secure the top, and attach the lamp shade. W

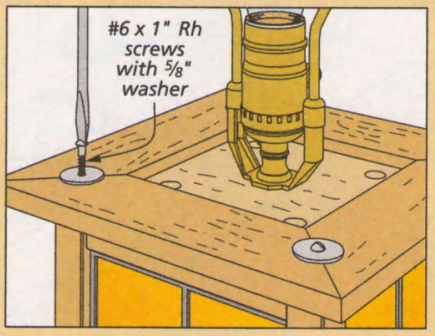
Assemble the Lamp



Assemble the Base. *Glue the stiles into the mortises and the rails to the face. A snug fitting tenon doesn't require a clamp.*



Add the Glass Panels. *The glass panels should slide into the grooves in the stiles without binding.*



Install the Light. *After fitting the upper socket into the frame, attach the frame using screws and washers.*

SHOP NOTEBOOK

Bench Seat Jig

Creating the sculpted seat for the bench on page 16 is a lot easier than it looks. The secret is to use a jig to support your router while you "scoop" out the seat, as shown in the photo at right.

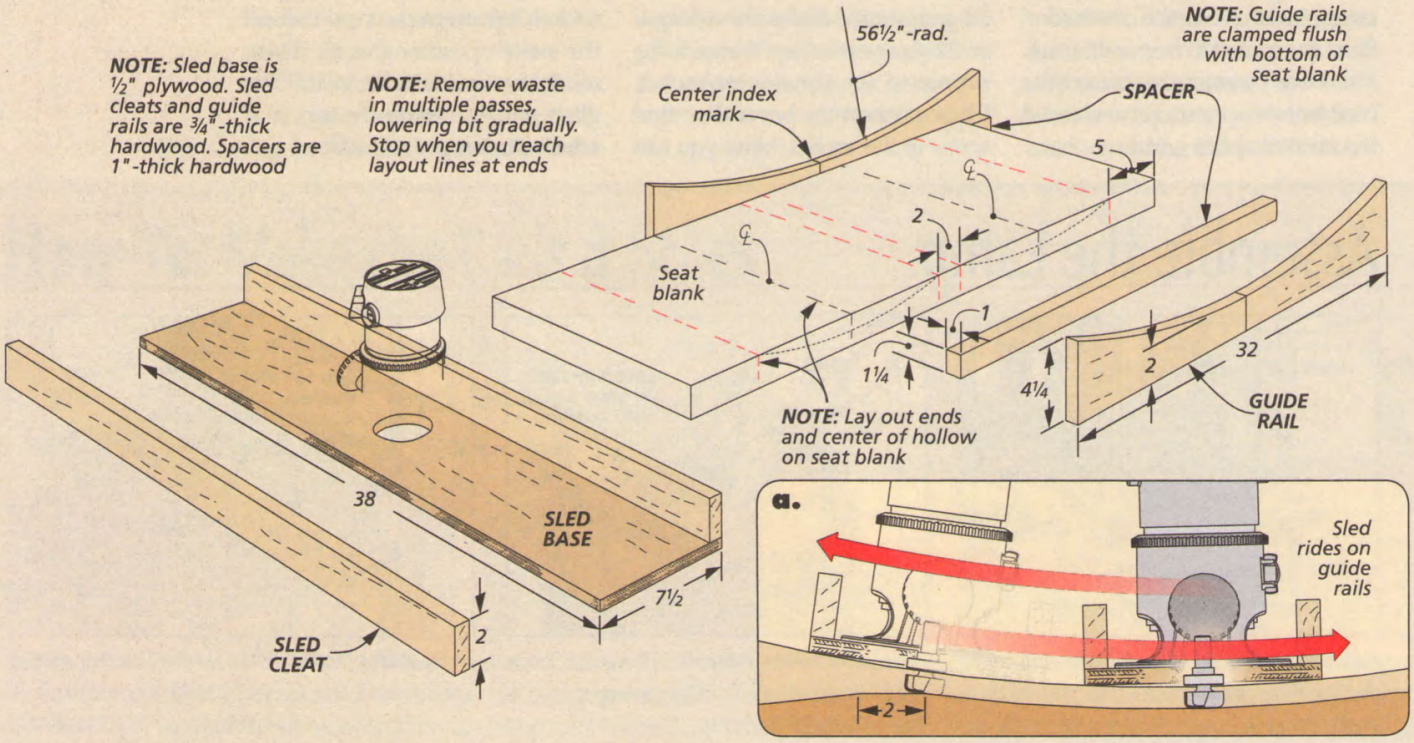
The router is attached to a long sled that rides on a pair of curved rails. The rails guide the router in a gentle arc. By making a series of overlapping, curved passes across the width of the seat blank, you create a hollow.

THE JIG. As you can see in the drawing below, the jig is really pretty simple. The sled is just a piece of ½" plywood with a pair of hardwood cleats added as stiffeners. And the guide rails are cut from hardwood. A spacer is glued to one face, flush with the bottom edge. This provides clearance for the router bit.

To use the jig, start by laying out the ends and centerline of the two hollows on the seat blank. Then clamp the guide rails of the jig against the edges of the blank. An index mark at the center of the guide rails helps with positioning the rails on the seat blank.

When it comes to the actual routing, you'll want to take light passes, removing no more than 1/16" of material at a time.

▼ A bowl and tray bit is used to shape the bench seat.

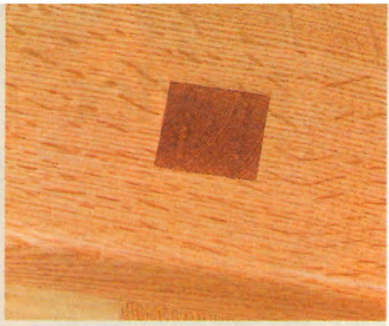


Wedged Tenons

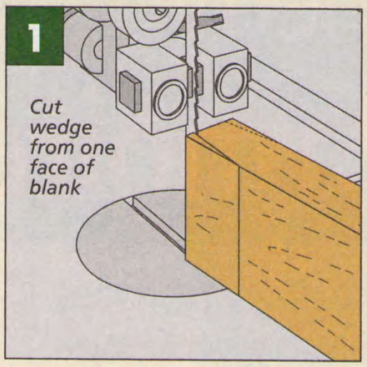
The seat of the bench on page 16 is joined to the base with wedged mortise and tenon joints. The wedges prevent the tenons from working loose. Because they're so thin, I cut them at the band saw.

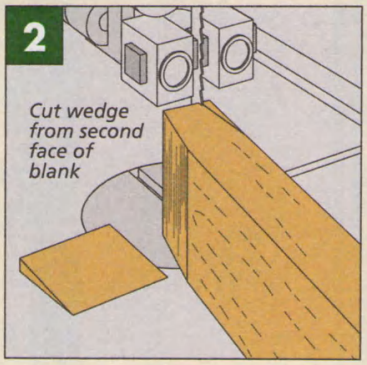
I started by ripping a blank to match the width of the tenon. At the band saw, I cut a thin wedge off one face of the blank (Figure 1). Next, I cut a second wedge off the opposite face (Figure 2).

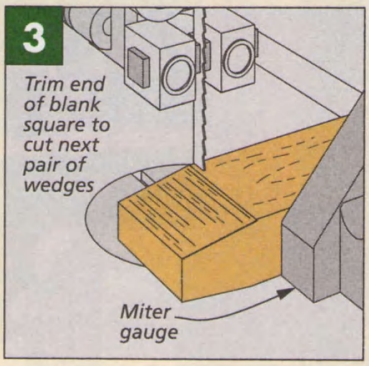
Before cutting the next pair of wedges, I simply crosscut the end of the blank, using a miter gauge, as shown in Figure 3.



▲ Thin wedges driven into the end of the tenon locks it in place.





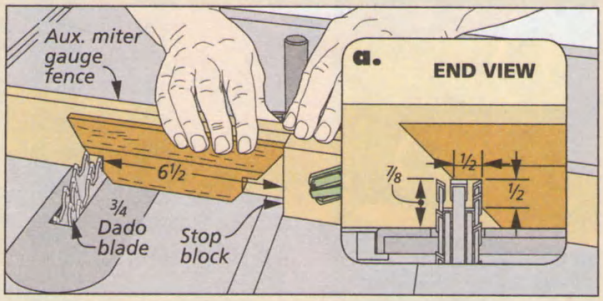


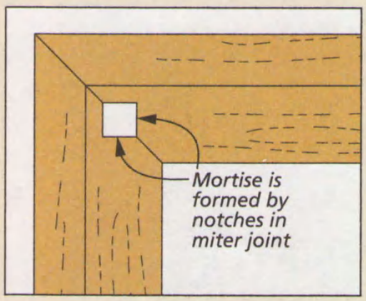
Square Mortises

Unless you own a mortising machine, creating a square mortise usually means drilling a hole and squaring up the sides with a chisel. Getting a tight fit is always a challenge, especially when you're dealing with through mortises, like the ones on the lamp on page 22.

Fortunately, in this case, there's an easier way. Because the mortises are centered on the joint lines of the mitered frames, you can actually cut the mortises on the table saw. The trick is to cut a notch on the end of each mitered piece to create half of the mortise, as shown in the upper left drawing. I used a stop block on my miter gauge fence in order to position all the notches identically.

When the frames are glued up, the notches will come together to form perfect, square mortises.

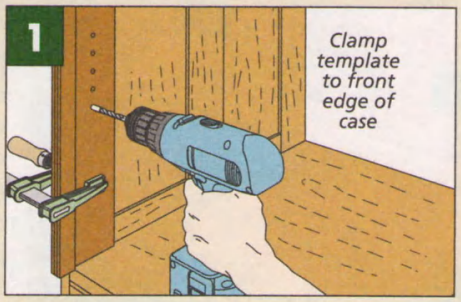


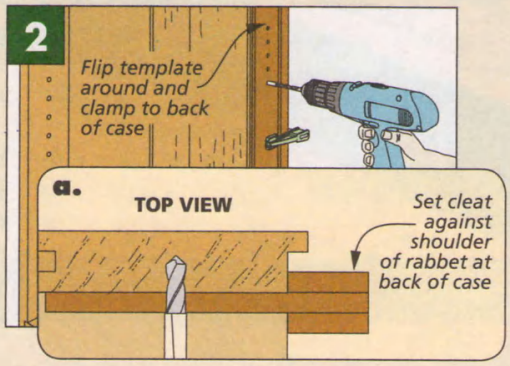


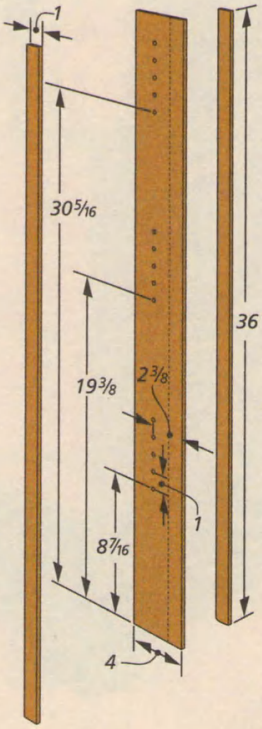
Shelf Pin Template

In order to drill the shelf pin holes in the case of the armoire on page 30, I made the simple drilling template shown at right. It's nothing more than a piece of hardboard with a row of ¼" holes drilled in it at the drill press. Cleats are added to both faces of the template to help position it against the case of the armoire.

To drill the holes at the front of the armoire, simply place the template so the cleat registers against the front edge of the case (Figure 1). Then to drill the back holes, place the template so the cleat registers against the shoulder of the rabbet cut in the back of the case (Figure 2). W







NOTE: All parts are ¼" hardboard

cherry Armoire

Offering three types of storage in a single, compact package, this stylish project serves all your needs.

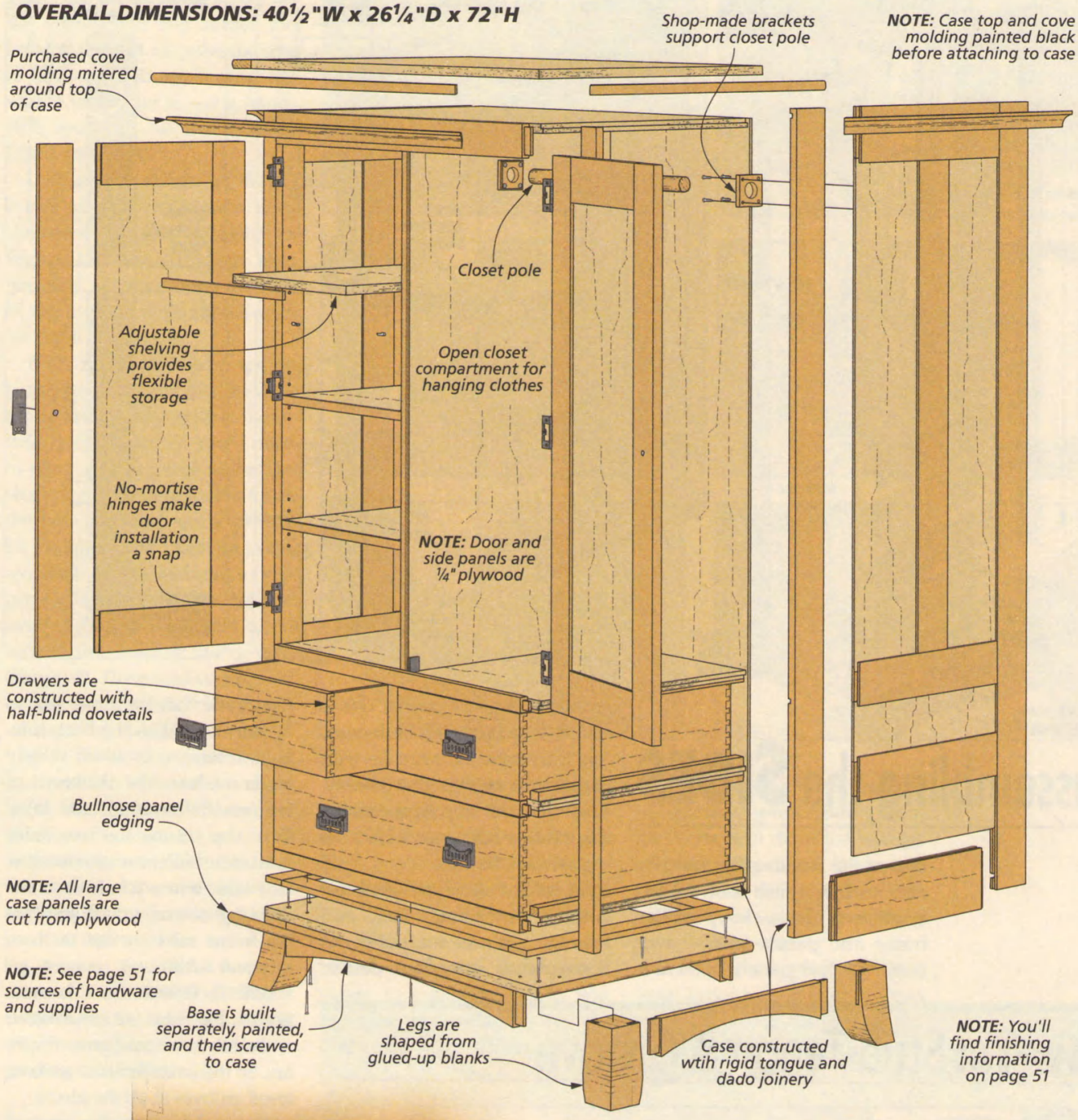
Having an abundance of storage options in the bedroom is an ideal situation. Of course, first off you need hanging "closet" storage. Then add to this some easy-access shelving. And don't forget a set of drawers to contain all the odd and ends. Now, how about incorporating all of these needs into one project? What you'd have is the attractive armoire shown at left — a versatile, all-in-one bedroom storage unit.

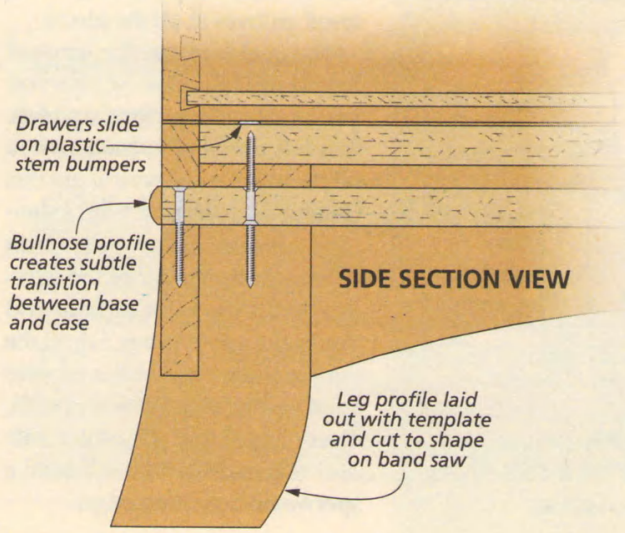
I won't try to fool you by downplaying the size of this project. But considering all the storage it supplies, the footprint is relatively compact — only about 2' by 3'. And honestly, the construction is a breeze. You'll find that the woodworking is straightforward and definitely pleasurable. I used an efficient mix of solid wood and plywood — no large panel glue-ups are required. Likewise, the joinery strikes a nice balance between strength and practicality.

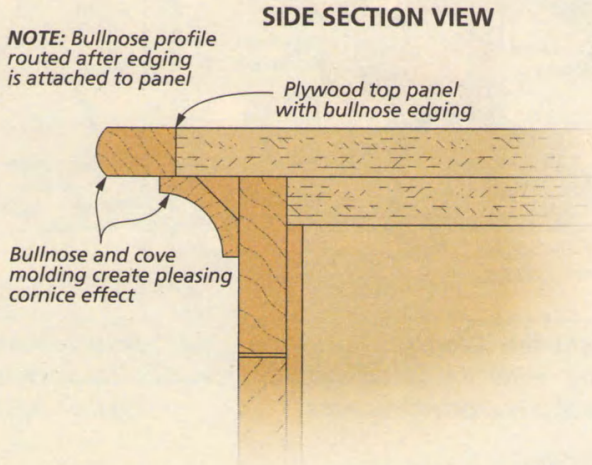
As you can clearly see, this armoire is more than just a big box. Although simple, the details really hit the nail on the head. From the flared feet of the base to the simple crown, it all works together perfectly. So what are you waiting for?

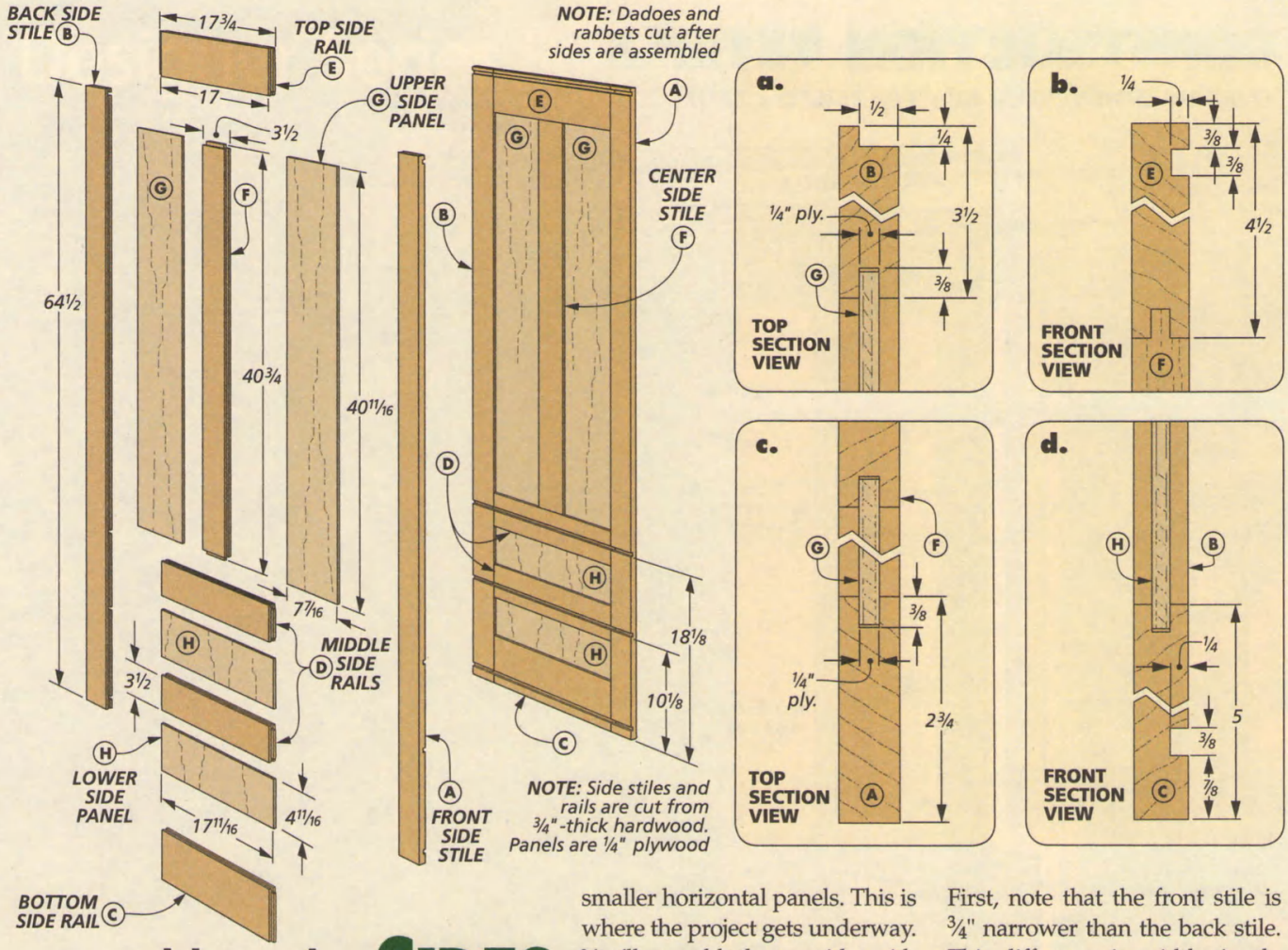
CONSTRUCTION DETAILS

OVERALL DIMENSIONS: 40½"W x 26¼"D x 72"H









assembling the SIDES

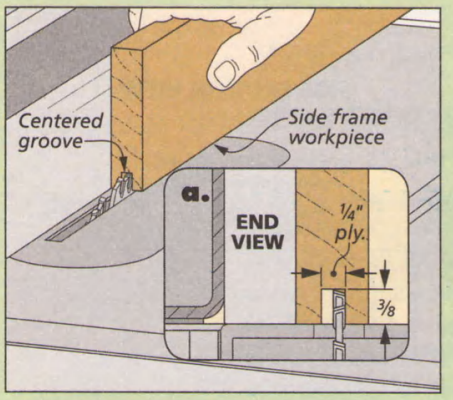
One of the features that contributes to the stylish look of the armoire is the makeup of the frame and panel sides — two large vertical panels over two smaller horizontal panels. This is where the project gets underway. You'll assemble the two sides with stub tenon and groove joinery. Then the next step is to connect them into a rigid case with a set of plywood dividers.

THE PARTS. Before you get busy cutting the frame rails and stiles to size, let me point out a couple of important details. First, note that the front stile is ¾" narrower than the back stile. This difference in width simply accommodates the thickness of the face frame you'll add later. This also means the two sides need to be built as mirror images. Likewise, when you look at the drawing above, you'll see that the frame rails are cut to three different widths.

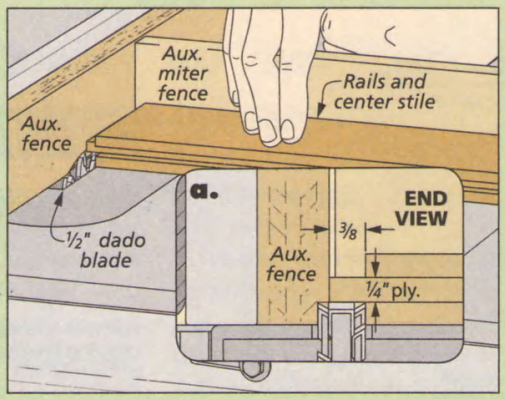
CENTERED GROOVES. As I mentioned, the sides are constructed with stub tenon and groove joinery. So the next step is to cut centered grooves in all the pieces.

The goal is to size the grooves for a snug fit over the ¼" plywood you're going to use for the panels. The left drawing in the How-To box shows a good way to get this done at the table saw. With a standard blade in the saw, start with a cut near the center of the edge. Then, flip the piece end-for-end and make a second cut. Adjust the rip fence and repeat the process until you're satisfied with the fit. Don't forget that the center stile and two middle rails will need a groove on both long edges.

How-To: Stub Tenon & Groove



Centered Grooves. *To accurately size and center the grooves, flip the pieces end-for-end between passes.*



Stub Tenons. *After adjusting the rip fence, sneak up on the thickness of the tenons by raising the blade between sets of passes.*

STUB TENONS. Now you can swap out the standard blade for a dado blade to cut stub tenons on both ends of the rails and center stile. In the right drawing in the box on the opposite page, you'll notice that I buried the blade in an auxiliary fence. This allows you to cut the full length of the tenon in a single pass. However, you'll still want to sneak up on the thickness of the tenons. A gap-free fit to the grooves will produce the strongest glue joint.

PANELS. Once the panels are cut to size, the side frames can be glued up. To ensure that the assembly went smoothly, I sized the panels for an overall 1/16" clearance in both dimensions.

PIECEMEAL GLUEUP. When it comes to involved glueups, I've always favored a relaxed, multi-step approach. Here, both the size and complexity of the assemblies make this especially appealing. The drawings in the box at right break it down for you.

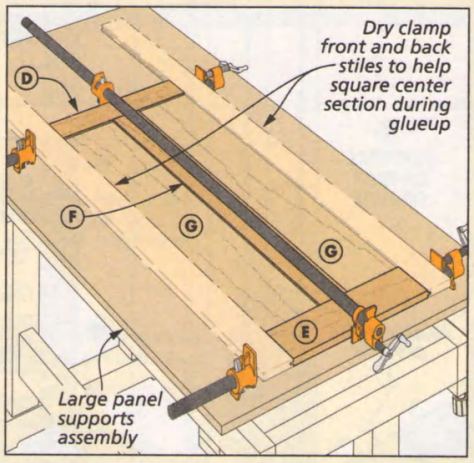
Since wood movement won't be a problem, you can glue the plywood panels into the grooves for a stronger assembly. And remember to check for square at each step along the way.

DADOES. The four horizontal dividers connect the sides with tongue and dado joints — a good choice for maximum racking resistance. So when the clamps come off and the assemblies are cleaned up, cutting the dadoes in the sides is your next task.

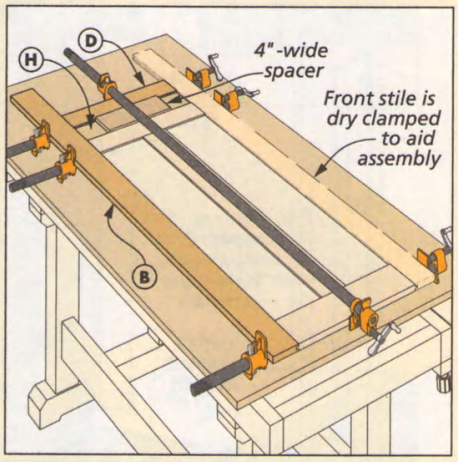
The box at right shows how I did this with a 3/8" dado blade in the table saw. The large side assemblies are a little bit unwieldy, but with some outboard support positioned to the left of the saw, it shouldn't be a problem. Make sure you cut the dadoes in pairs so they align accurately.

BACK RABBET. After cutting all four pairs of dadoes, I completed this stage of the work by cutting rabbets to hold the 1/4" plywood back panel. You can use the same dado blade but you'll need to bury it in an auxiliary rip fence.

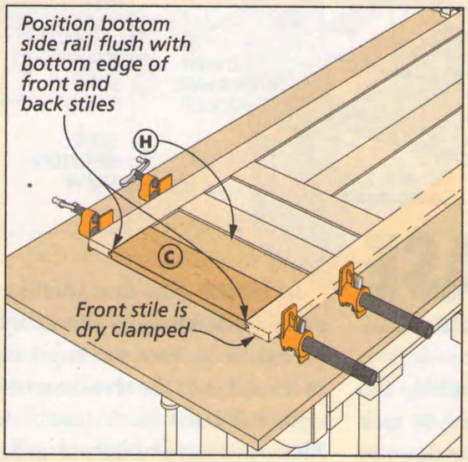
Shop Tip: A Step-By-Step Glueup



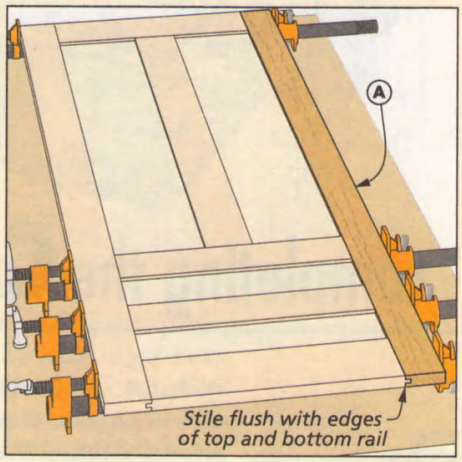
Step One. *Glue the center stile and upper panels between the top and upper middle rail. The outer stiles keep things square.*



More Parts. *Next, add one outer stile, the upper horizontal panel, and the lower middle rail. A spacer helps position the rail.*

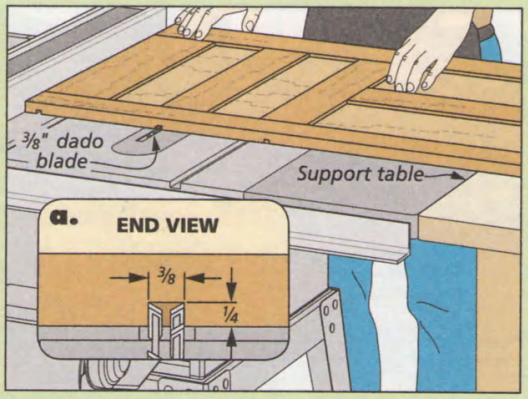


A Small Step. *I continued the assembly with an easy addition — the bottom rail and the lower horizontal panel.*

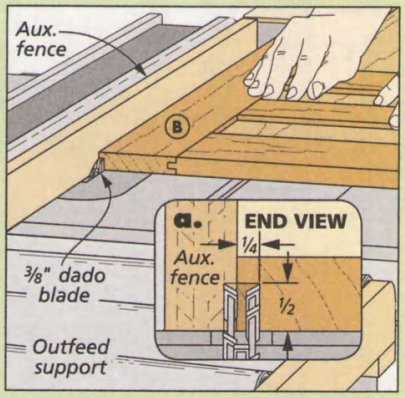


Wrap It Up. *After doing its part to help keep everything aligned and square, the front stile can now be glued in place.*

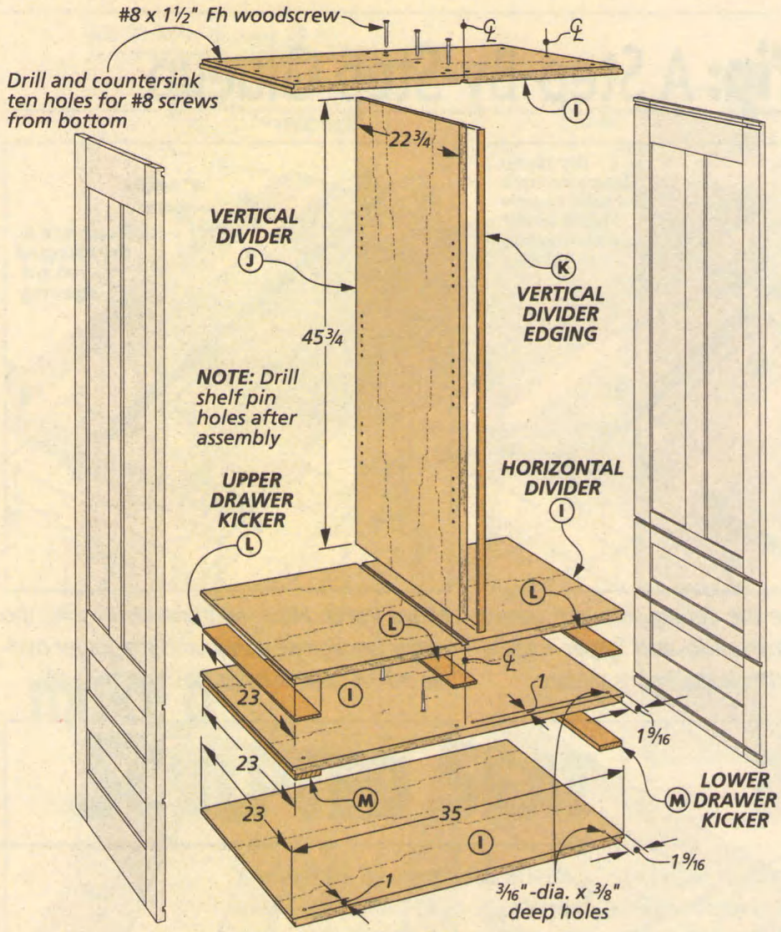
How-To: Dadoes & Rabbet

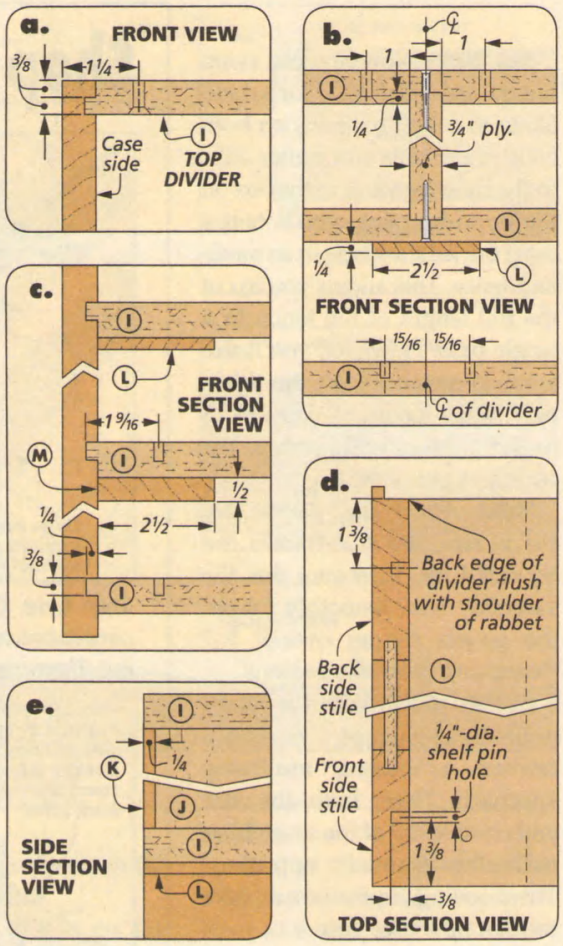


Dadoes. *Use the rip fence to locate the dadoes in the side assemblies. Cut the corresponding dadoes in both sides before readjusting the fence.*

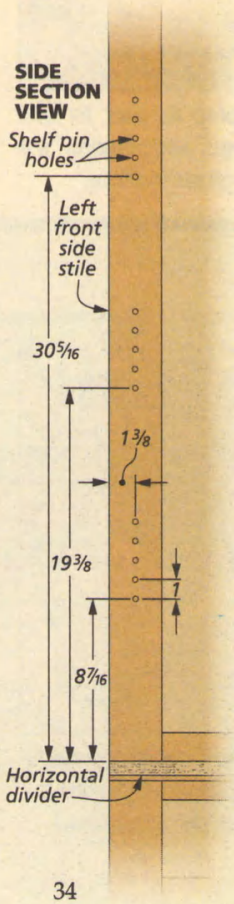


Back Rabbet. *You'll have to bury the blade in an auxiliary rip fence to cut the rabbets for the plywood back.*





completing the CASE



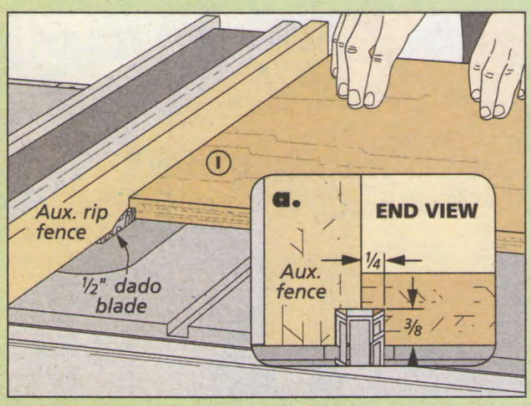
With the sides completed, the pace of progress is going to pick up. After fitting the horizontal and vertical dividers, you can assemble the case and then add a face frame and the back.

THE DIVIDERS. The four identically sized horizontal dividers should be cut to fit from the front edge of the sides to the shoulder of the rabbet for the back (detail 'd'). Then you can switch to a dado blade to cut a tongue on each end, as shown in the box below and details 'a' and 'c.'

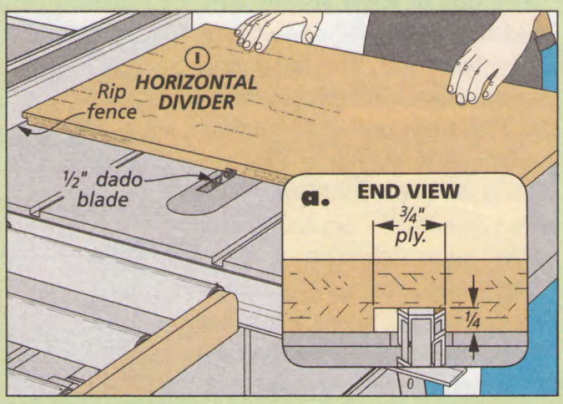
The vertical divider is captured in a pair of centered dadoes in the top and upper middle horizontal divider (How-To box and detail 'b'). Just take care to cut these dadoes on the correct faces.

The front edge of the vertical divider won't be covered by the face frame. So after cutting this

How-To: Divider Joinery



Tongues. *I buried a dado blade in an auxiliary rip fence to cut tongues on the horizontal dividers. Gradually tweak the blade height for a snug fit.*



Centered Dadoes. *To accurately center and size the dadoes for the vertical divider, make two passes flipping the panels end-for-end in between.*

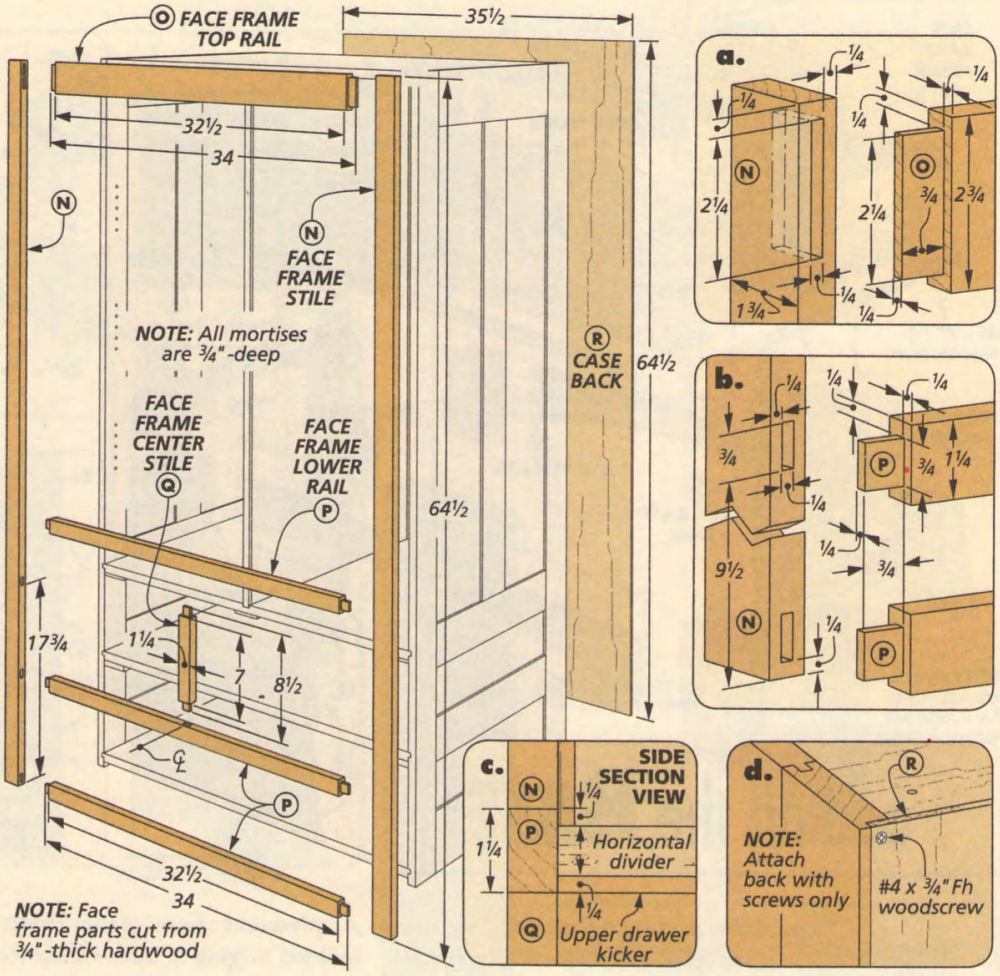
part to size, you'll need to add a piece of ¼"-thick edging, as shown in detail 'e,' opposite.

LOTS OF HOLES. Now before you begin putting the pieces together, you have several "boring" tasks to take on. First, the bottom and lower middle divider need holes for stem bumpers that act as drawer glides (details 'b' and 'c,' opposite). The top and upper middle divider each get a set of countersunk screw holes used to fasten the vertical divider (detail 'b,' opposite). Finally, the top divider has a set of countersunk holes used to attach the top.

A RELAXED ASSEMBLY. Like the side frames, it works best to tackle the assembly in stages. I started by fastening the vertical divider between the top and upper middle divider with glue and screws. Then, I glued this assembly to one side. I followed up with the remaining dividers, and finally added the second side.

INTERIOR DETAILS. When the clamps come off, you can finish up a few interior details. First, the upper left compartment needs holes for shelf pins. As shown on page 29, these can be drilled accurately with the aid of a template. The margin drawing on the opposite page shows where they go.

And while access was still wide open, I added a set of kickers to the drawer openings (main drawing and detail 'c,' opposite page).



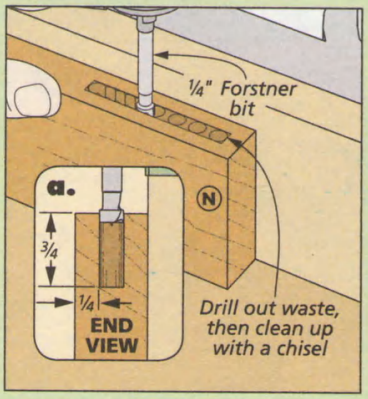
A FACE FRAME. The case is now ready for a face frame. As you can see above, I constructed the large face frame with mortise and tenon joints to take advantage of the rigidity this joinery provides. Aside from the size, building the face frame is really pretty straightforward.

After cutting all the pieces to size, I laid out the mortises in the stiles and two of the rails. If you position the corresponding pieces side-by-side, you can get this done quickly and accurately. Let me note that while the two lower rails flush out with the top of the dividers, the upper middle rail is positioned to form a ¼" tall containment lip at the front of the upper compartment (detail 'c').

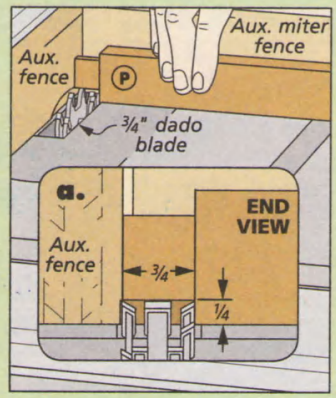
From here on out, the How-To box at left is your guide. I drilled out the mortises at the drill press and then squared them up at the bench. A dado blade in the table saw will take care of the tenons. And once assembled, the face frame is simply glued to the front of the case. Plenty of clamps and cauls is the key here.

THE BACK. The case can be wrapped up by adding the plywood back. To allow it to be removed for access, I installed it with screws only (detail 'd').

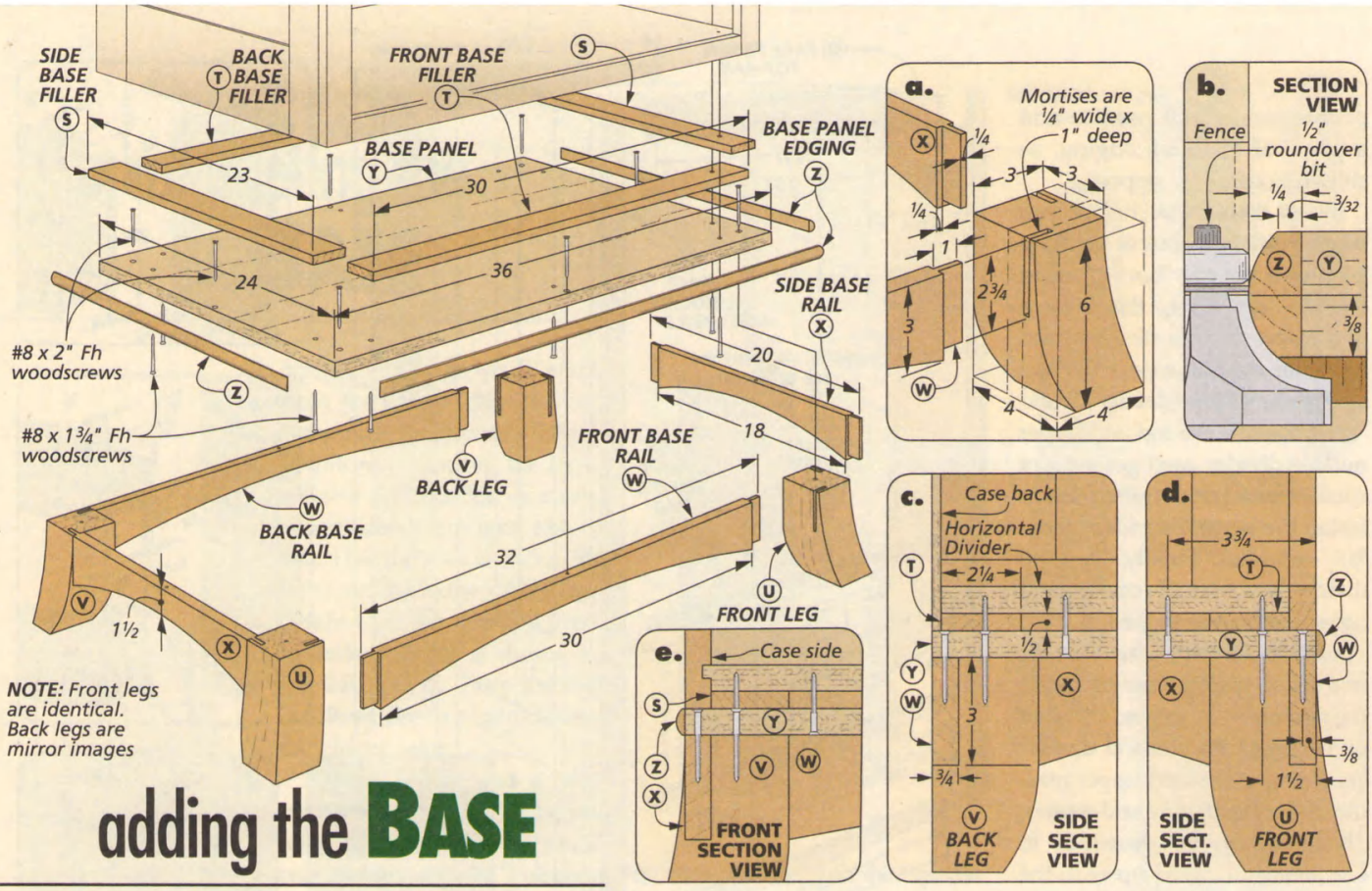
Face Frame Joinery



Mortises. *Start by drilling a series of unconnected holes, then remove the waste between them.*



Tenons. *After cutting the tenons to thickness, you'll need to trim the edge shoulders.*



adding the BASE

The curves of the base are a nice complement to the straight lines of the case. Making and installing this assembly was next on my list.

FILLERS. Before tackling construction of the base, I thought I'd better prepare the case for it. All this takes is the addition of a set of fillers to the underside of the case, as in the main drawing.

LEGS FIRST. The base starts by assembling a frame made up of four legs and four rails. A plywood base panel with molded edging is then added to the top of the frame.

I started on the base by shaping the four flared legs. As you see in details 'c' and 'd,' the front and back legs are slightly different. While both outside faces of the front legs flare outward, the rear face of the back legs is flat. However, as you'll see, the procedure for making both sets follows essentially the same course.

All the legs start as 4"-square by 6"-long blanks. So I glued up one long blank by sandwiching a layer of ¾"-thick stock between two layers of 1¾"-thick stock. Then I planed it to final thickness before cutting the leg blanks from it.

STEP-BY-STEP. At this point, you can refer to the box on the following page for step-by-step guidance. I'll fill in any blanks.

The front legs are identical while the back legs end up as

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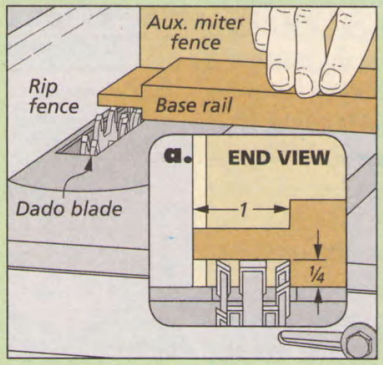
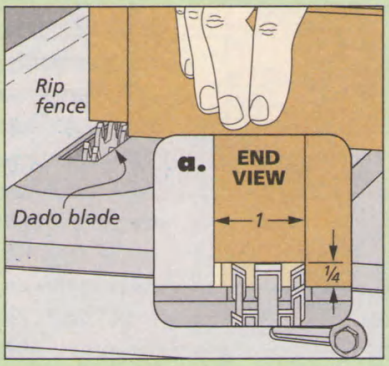
You'll find a full-size pattern for the legs on our website at Woodsmith.com

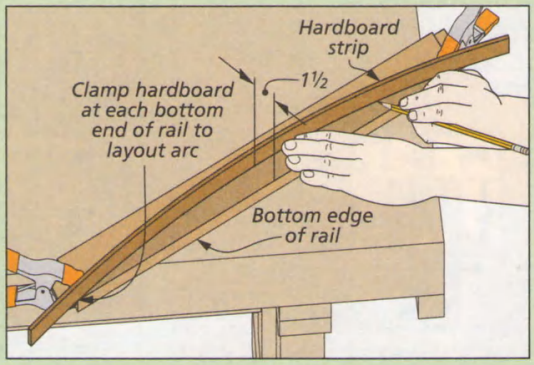
How-To: Make the Base Rails



Several Passes. *I cut the 1"-long tenons on the rails with a couple passes across a wide dado blade.*



Edge Shoulders. *Next, you'll need to cut a short shoulder on only the lower edge of each tenon.*



Rail Profiles. *Mark the height of the profile at the rail's centerpoint. Then bend a flexible strip of hardboard to your mark and trace along it.*

a mirror-image pair. And even though they have different final dimensions and shapes, it's easier to begin the job from the same point. Then, along the way you can simply skip one of the profile cuts on the back legs and replace it with a straight trim cut. However, I did take a minute to clearly mark which blank would go where.

MORTISES. The legs are connected to the base rails with open end mortise and tenon joints. You'll want to lay out and cut the mortises while the blanks are square.

THE SHAPING. There are really only a couple tricks to shaping the legs at the band saw. The first is to make a hardboard template to simplify the layout. To do this, you can use the half-size pattern shown at right or you'll find a full-size pattern on our website.

Your other secret weapon is masking tape. As you cut the profiles, you begin to eliminate the flat surfaces needed for layout and stability on the following cuts. The solution is to save the cutoffs and tape them back in place. It's simple and it works.

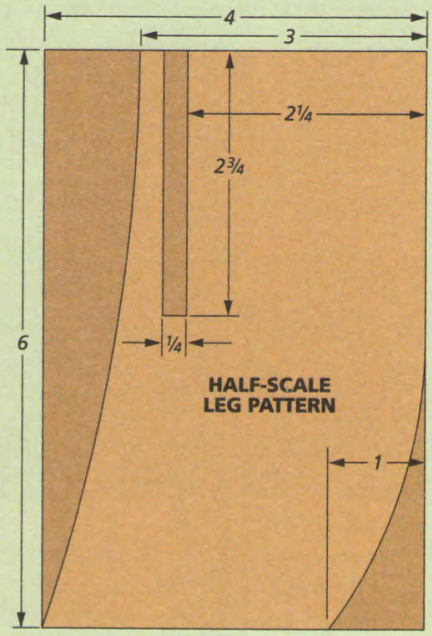
THE RAILS. I guarantee that making the base rails will go a lot faster. The How-To box and drawings on the opposite page provide the basic details you'll need. And once the profiles on the rails are cut and smoothed, you can glue up the base frame.

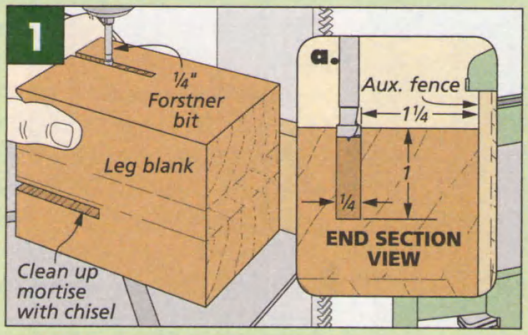
BASE PANEL. Adding the base panel will complete the job. It's simply a piece of plywood with molded edging mitered around the front and both sides.

Once the panel is cut to size, you can miter the ¼"-thick edging to fit and glue it in place. It's easier to rout the bullnose profile with the edging already attached (detail 'b,' opposite page).

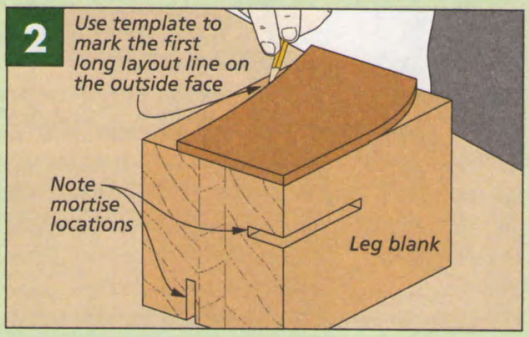
The top panel is screwed and glued to the base frame. But before doing this, I drilled the countersunk screw holes on the underside used to attach the base to the case. Once this is done, you can install the panel and then screw the base to the case.

How-To: Flared Legs

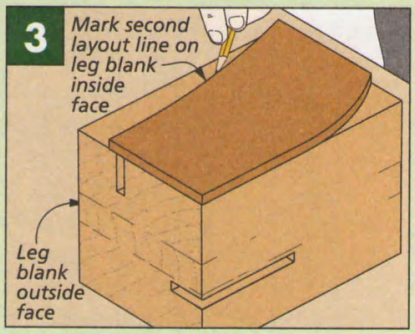




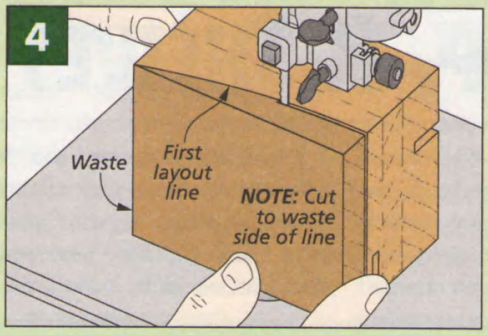
Mortises First. *To accommodate the profiles, locate the mortises 1¼" from the outside faces. Drill out the waste, then square them with chisels.*



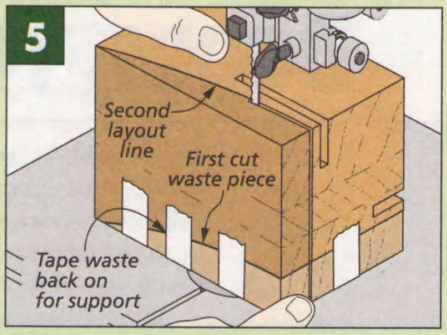
Outside Faces First. *I wanted the profiles on the outside to look their best, so I laid out and cut these first. Mark one profile on the outside face.*



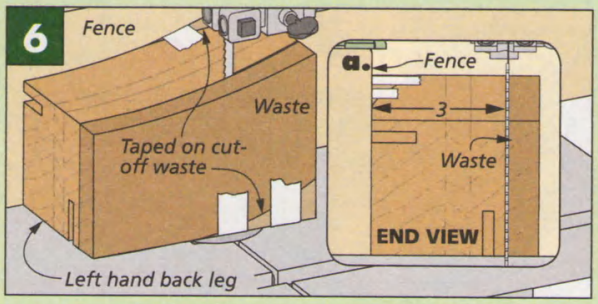
Second Profile. *Then if you mark the second profile on the inside face, it won't be cut away during the first cut.*



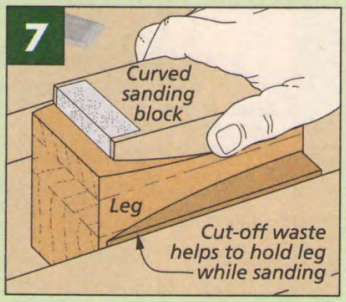
First Cut. *Since the blank is still square, making the first cut is easy. To minimize cleanup, steer close to the outside of the layout line.*



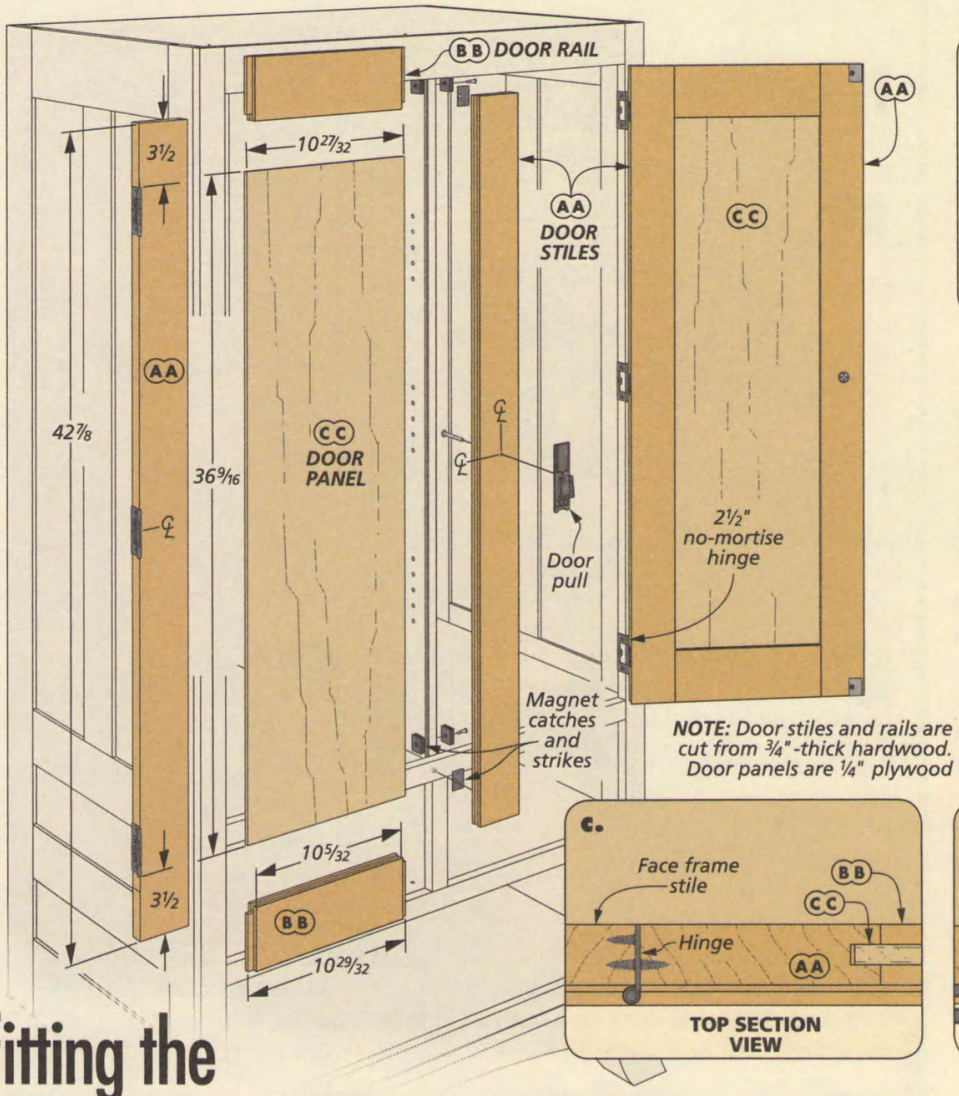
Time for Tape. *Before cutting the second outside profile, you'll need to reattach the cut off piece with masking tape.*



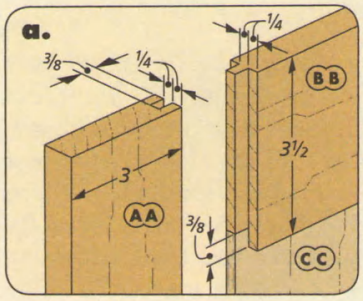
Trim Cut. *The back legs have a profile cut on only one outside face. So after completing the three other cuts, you can trim 1" from the back face of each back leg.*

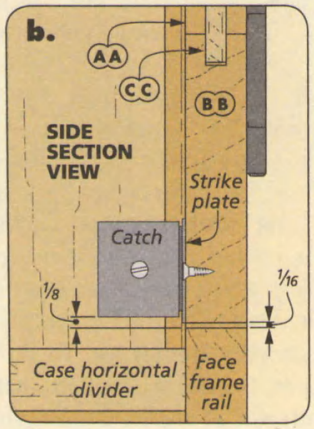


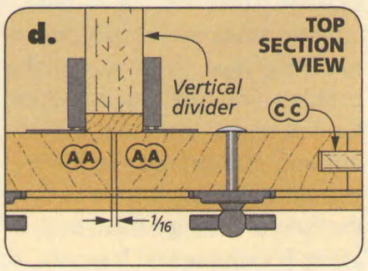
Sanding. *Start sanding with 80-grit paper and work up to smooth the cut faces of the legs.*



NOTE: Door stiles and rails are cut from ¾"-thick hardwood. Door panels are ¼" plywood







fitting the DOORS, TOP, & SHELVES

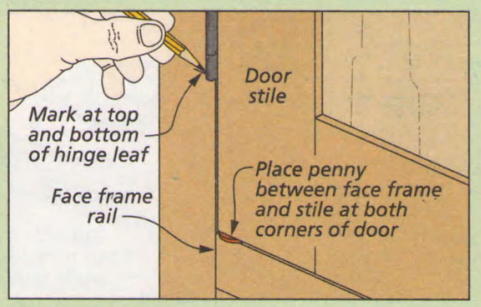
With the base in place, the armoire is really beginning to take shape. After the next few stages, starting with the addition of the doors, you'll see an even bigger change.

THE DOORS. Building the two frame and panel doors will seem pretty familiar. They're assembled with the same stub tenon and groove joints you used to assemble the side frames (detail 'a'). I won't go over this joinery again, but I will offer some advice you may find helpful.

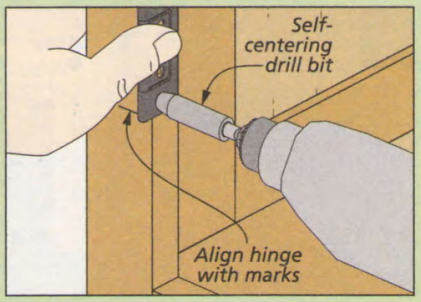
I sized the doors to allow for a 1/16" gap on all sides and between the doors. And since they're fairly large, you want to be pretty particular about stock selection when cutting your stiles and rails to size. Starting with straight, flat, and accurately dimensioned parts will give you a better shot at ending up with doors that fit well.

Likewise, once the joinery is completed and the panels cut to size, take extra care during the glueup. Be sure to double check for square. And to avoid ending up with a twisted door, make sure the assemblies lie perfectly flat while the glue dries.

How-To: Hinge Installation



Mark. *With the hinges attached to the doors and the doors in the openings, mark the hinge location on the face frame.*



Pilot Holes. *Next, I removed one of the hinges and used it as a template to drill pilot holes with a self-centering bit.*

HINGES, CATCHES, & PULLS. Once the clamps come off, the doors can be installed on the case. No-mortise hinges make this a pretty quick task. A look at the box at the bottom of the opposite page will provide some help with this. Then after adding the pulls, I mounted a pair of magnetic catches for each door, as shown in the main drawing and details 'b' and 'd' on the opposite page.

THE CORNICE. Next, I finished up work on the top of the case. As you can see in detail 'a' at right, an overhanging top and a simple cove molding create a pleasing, traditional cornice effect.

The procedure for making the top is identical to that used for the base panel. I wrapped a plywood panel with a wider hardwood edging and then routed the same bullnose profile at the router table (How-To box below). When the panel is ready to go, you can screw it to the top of the case, flush at the back (detail 'd').

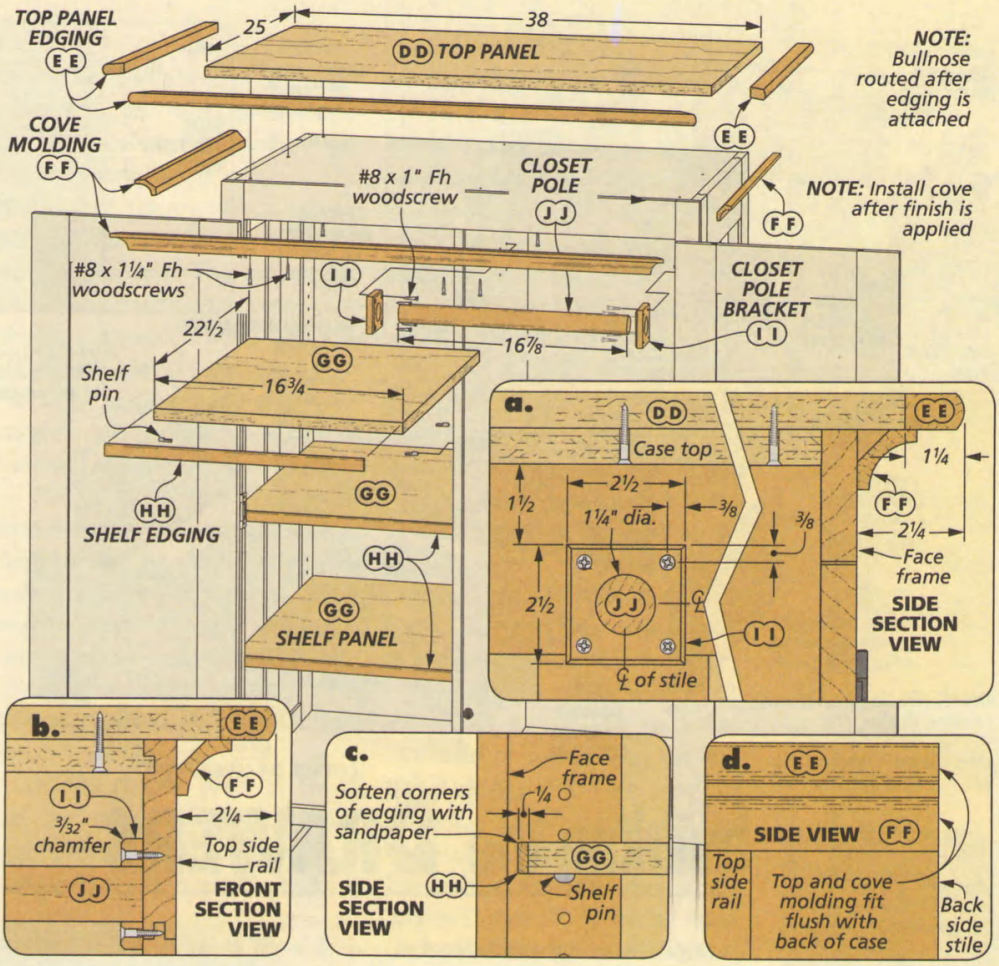
THE COVE. When it came time to add the cove, I took the easy route and used purchased molding. As you can see above, it's mitered around the front and sides. However, since I planned to paint the top panel and cove molding (and base) black, I decided to fit the molding now but wait until after it was painted to tack it in place.

SHELVES. Finishing up the interior of the upper compartment is your next focus. This starts by making a set of shelves to fill the left side. As you can see in the drawing above and detail 'c,' the three identical shelves consist of a plywood panel with thin hardwood edging glued to the front. This won't take you long.

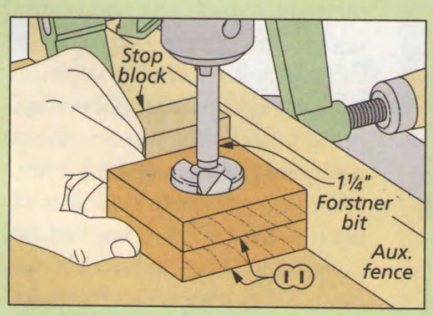
CLOSET POLE. The right side of the upper compartment provides space to hang clothes. So here, you're going to install a closet pole near the top of the opening.

The pole (just a section of 1¼"-diameter dowel) is supported by shop-made brackets (detail 'a'). The How-To box below shows how I made them by drilling a hole through a square block and chamfering the edges.

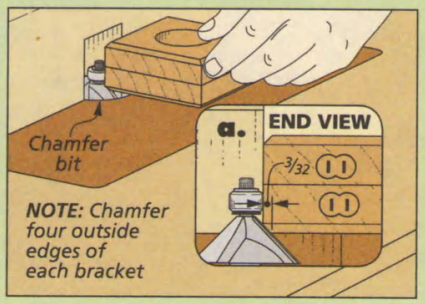
After drilling countersunk screw holes, I positioned the brackets to drill pilot holes. Then I cut the pole to length and installed it and the brackets all at once.



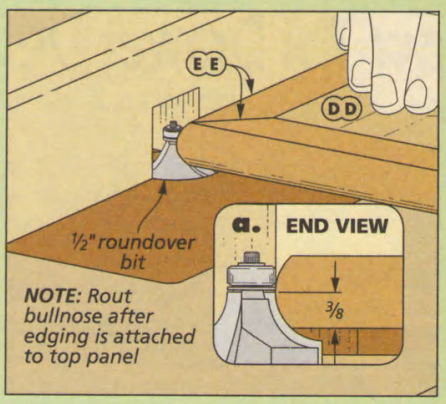
How-To: Brackets & Bullnose



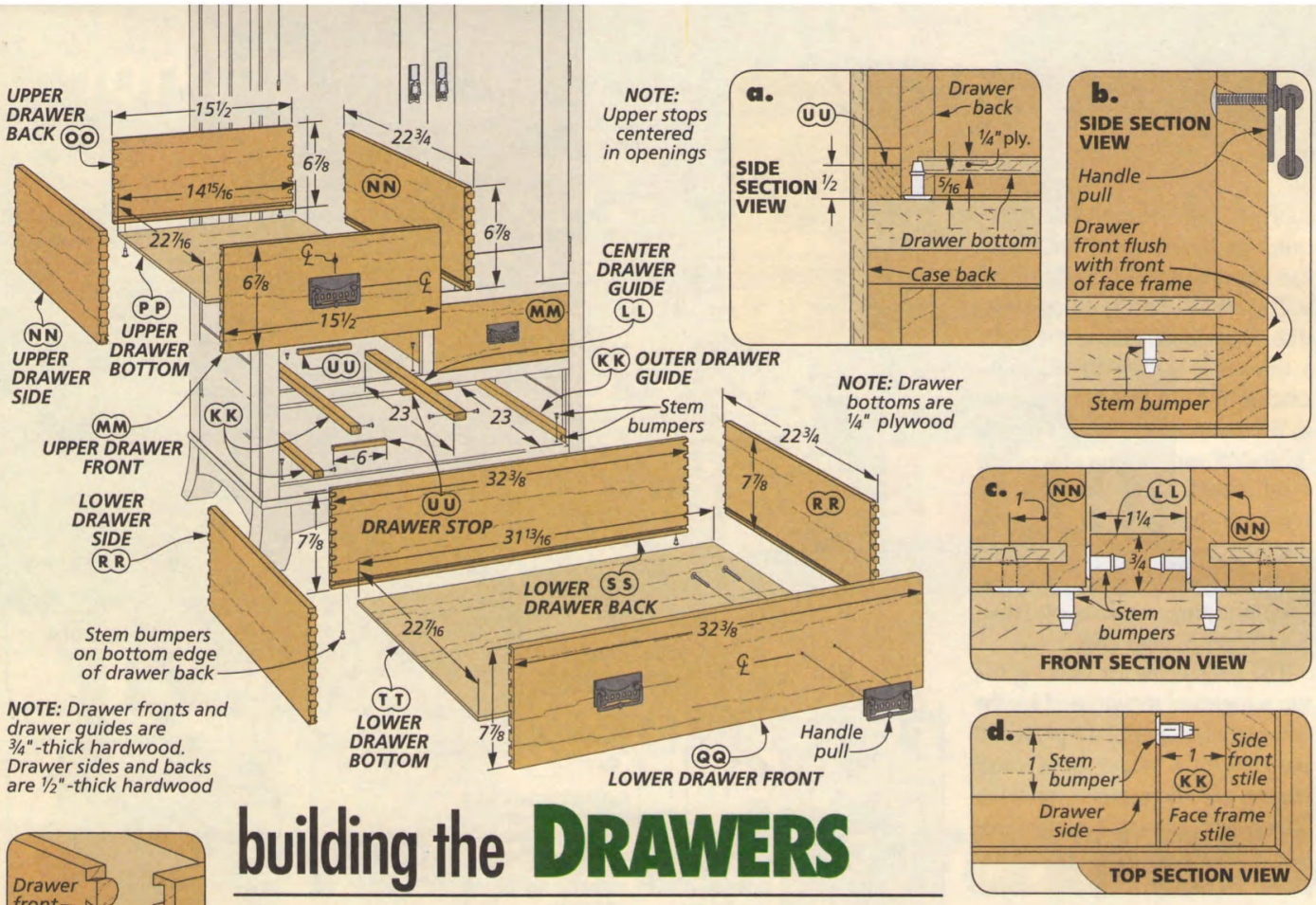
Holes First. *I fastened the two bracket blocks together with double-sided tape and drilled both through holes at once.*



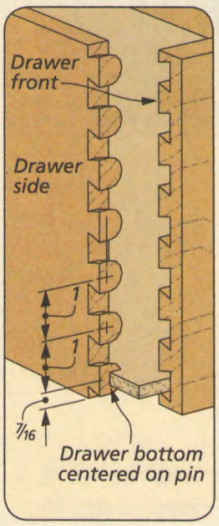
Chamfer Next. *If you leave the blocks paired up while routing the chamfers, you'll have more to hold on to.*



A Bullnose. *With a roundover bit in the router table, make a pass from each face to produce a classic bullnose profile.*



building the DRAWERS



You can see the light at the end of the tunnel. Building and installing the three drawers will bring the construction to an end.

GUIDES. Since the drawers don't use metal runners, the first thing I did was add a pair of guides to the openings (main drawing). A center guide positioned behind the dividing stile serves both upper drawers (detail 'c'). They should fit flush with the inside edges of the face frame stiles (detail 'd'). And don't forget to drill stem bumper holes before gluing them in place. (This is easier if you remove the case back.)

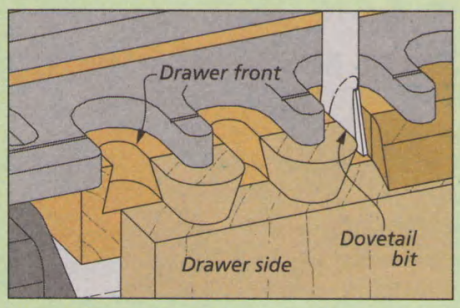
DOVETAILS. I took the traditional route and used half-blind dovetail joinery to build the drawers. But I also gave in to efficiency and used my dovetail jig to rout the joints. The only catch is that good results with a dovetail jig are not automatic. So if you need a refresher course on successfully building dovetailed drawers, check out the article on page 14.

THE OTHER DETAILS. Now let me go over the other important details. The drawer fronts are cut from ¾"-thick cherry, while the sides and backs are ½"-thick maple. And as usual, the bottoms are ¼" plywood. Like the doors, I sized the parts to create a 1⁄16" gap on all four sides. One more thing — the height of the drawers is based on cutting 7° dovetails with a 1" on-center spacing (margin drawing).

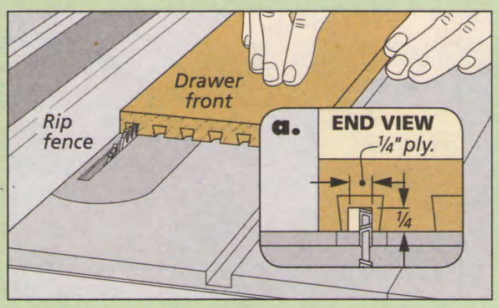
With the dovetail jig put back in its place, you can cut grooves for the bottoms (How-To box), cut the bottoms to size, and assemble the drawers. Before sliding the drawers into their openings for a test fit, I added pulls and stem bumpers to the bottom edges of the backs (detail 'c'). Finally, stops can be fit at the backs of the openings.

FINISH. While the armoire looks pretty impressive at this point, you don't get the full effect until the two-tone finish is applied. So it wasn't long before I started disassembling the pieces for paint and finish. But don't be in too big a hurry — the end result will certainly be worth the wait. W

How-To: Drawer Details



Attention to Detail. *The keys to building drawers with machine-cut dovetails are simply careful setup and execution.*



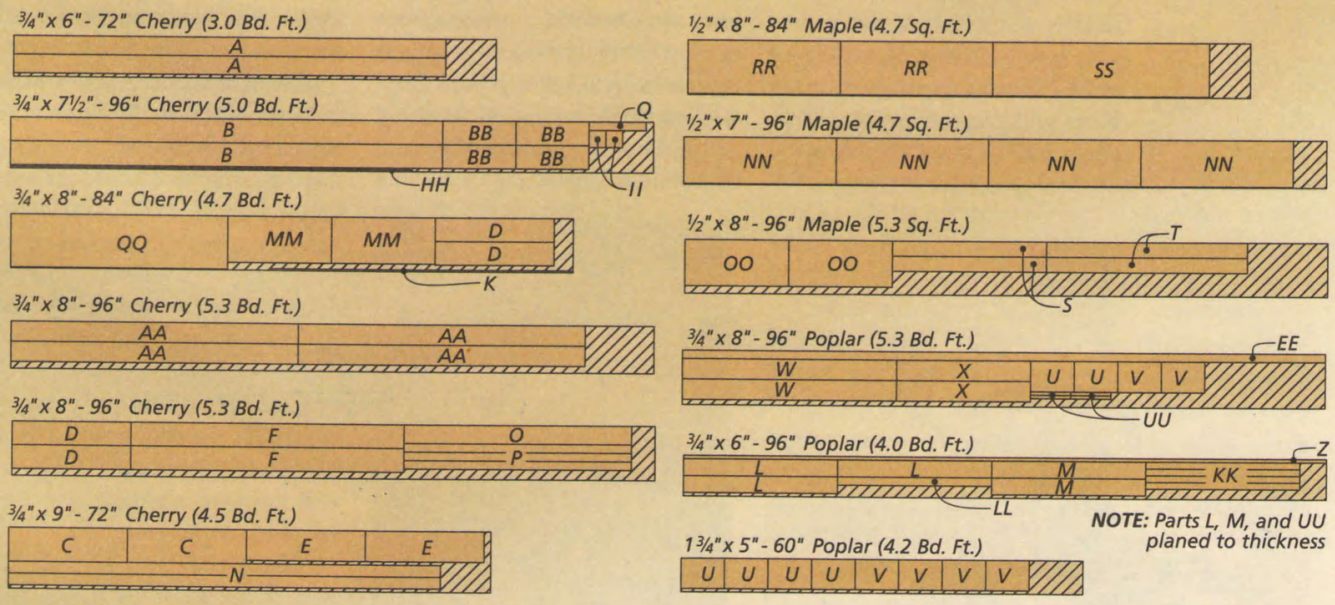
Grooves. *To size the bottom grooves to the plywood, start with a single cut. Then tweak the rip fence setting until the fit is snug.*

Materials & Supplies

A	Front Side Stiles (2)	3/4 x 2 3/4 - 64 1/2
B	Back Side Stiles (2)	3/4 x 3 1/2 - 64 1/2
C	Bottom Side Rails (2)	3/4 x 5 - 17 3/4
D	Middle Side Rails (4)	3/4 x 3 1/2 - 17 3/4
E	Top Side Rails (2)	3/4 x 4 1/2 - 17 3/4
F	Center Side Stiles (2)	3/4 x 3 1/2 - 40 3/4
G	Upper Side Panels (4)	1/4 ply. - 7 7/16 x 40 11/16
H	Lower Side Panels (4)	1/4 ply. - 17 11/16 x 4 11/16
I	Horizontal Dividers (4)	3/4 ply. - 23 x 35
J	Vertical Divider (1)	3/4 ply. - 22 3/4 x 45 3/4
K	Vertical Divider Edging (1)	3/4 x 1/4 - 45 3/4
L	Upper Drawer Kickers (3)	1/4 x 2 1/2 - 23
M	Lower Drawer Kickers (2)	1/2 x 2 1/2 - 23
N	Face Frame Stiles (2)	3/4 x 1 3/4 - 64 1/2
O	Face Frame Top Rail (1)	3/4 x 2 3/4 - 34
P	Face Frame Lower Rails (3)	3/4 x 1 1/4 - 34
Q	Face Frame Dividing Stile (1)	3/4 x 1 1/4 - 8 1/2
R	Case Back (1)	1/4 ply. - 35 1/2 x 64 1/2
S	Side Base Fillers (2)	1/2 x 2 1/4 - 23
T	Front/Back Base Fillers (2)	1/2 x 2 1/4 - 30
U	FrontLegs(2)	4 x 4 - 6
V	Back Legs (2)	3 x 4 - 6
W	Front/Back Base Rails (2)	3/4 x 3 - 32
X	Side Base Rails (2)	3/4 x 3 - 20
Y	Base Panel (1)	3/4 ply. - 24 x 36
Z	Base Panel Edging (1)	3/4 x 1/4 - 96 rgh.
AA	Door Stiles (4)	3/4 x 3 - 42 7/8
BB	Door Rails (4)	3/4 - 3 1/2 x 10 29/32
CC	Door Panels (2)	1/4 ply. - 10 27/32 x 36 9/16
DD	Top Panel (1)	3/4 ply. - 25 x 38
EE	Top Panel Edging (1)	3/4 x 1 1/4 - 96 rgh.
FF	Cove Molding (1)	9/16 x 1 3/4 - 96 rgh.
GG	Shelf Panels (3)	3/4 ply. - 22 1/2 x 16 3/4
HH	Shelf Edging (1)	3/4 x 1/4 - 60 rgh.
II	Closet Pole Brackets (2)	1/2 x 2 1/2 - 2 1/2
JJ	Closet Pole (1)	1 1/4-dia. - 16 7/8
KK	Outer Drawer Guides (4)	3/4 x 1 - 23
LL	Center Drawer Guide (1)	3/4 x 1 1/4 - 23
MM	Upper Drawer Fronts (2)	3/4 x 6 7/8 - 15 1/2
NN	Upper Drawer Sides (4)	1/2 x 6 7/8 - 22 3/4
OO	Upper Drawer Backs (2)	1/2 x 6 7/8 - 15 1/2
PP	Upper Drawer Bottoms (2)	1/4 ply. - 22 7/16 x 14 15/16
QQ	Lower Drawer Front (1)	3/4 x 7 7/8 - 32 3/8
RR	Lower Drawer Sides (2)	1/2 x 7 7/8 - 22 3/4
SS	Lower Drawer Back (1)	1/2 x 7 7/8 - 32 3/8
TT	Lower Drawer Bottom (1)	1/4 ply. - 22 7/16 x 31 13/16
UU	Drawer Stops (4)	1/2 x 1/2 - 6

- (3 pr.) 2 1/2" No-Mortise Hinges w/Screws
- (2) Drop Pulls
- (4) Handle Pulls
- (12) 1/4" Shelf Pins
- (4) Low-Profile Magnetic Catches
- (4) #6 x 5/8" Ph Woodscrews (for catches)
- (18) Plastic Stem Bumpers
- (25) #4 x 3/4" Fh Woodscrews
- (8) #8 x 1" Fh Woodscrews
- (10) #8 x 1 1/4" Fh Woodscrews
- (6) #8 x 1 1/2" Fh Woodscrews
- (10) #8 x 1 3/4" Fh Woodscrews
- (8) #8 x 2" Fh Woodscrews

Cutting Diagram



NOTE: *Parts L, M, and UU planed to thickness*

ALSO NEEDED: *One 48" x 96" sheet 3/4" Cherry Plywood; One 48" x 48" sheet 3/4" Cherry Plywood; Two 48" x 96" sheets 1/4" Cherry Plywood One 48" x 96" sheet 3/4" Maple Plywood; One 24" x 96" sheet 1/4" Maple Plywood; Cove Molding; 1 1/4"-dia. x 18" Maple Dowel*

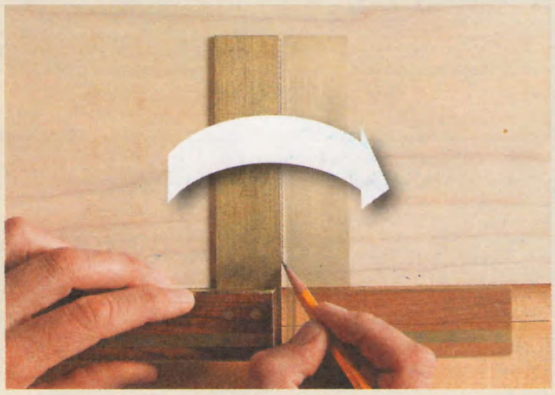
tips for

Building From Plans

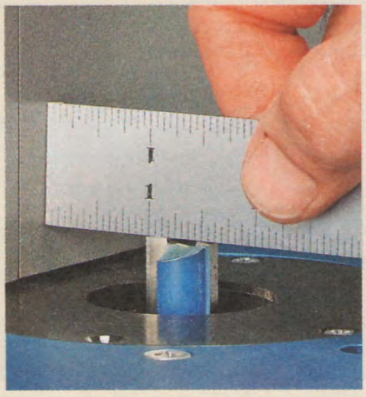
To get the best results from a woodworking plan, it pays to have a well-thought-out plan of your own for how to proceed.

Building a project from a set of plans can be a great experience. In theory, the plans have all the details worked out. But unless you work flawlessly and your stock doesn't expand or contract, there will likely be a few differences due to small deviations or other, unpredictable changes.

So beyond the standard advice like, "measure twice, cut once," here are a few more tips you can use while building a project from a plan. They're sure to help you successfully complete your projects and build your woodworking skills. They're also helpful even if the plan is your own.



▲ To test the accuracy of a square, hold it against the edge of a board and draw a line. Then, flip it over and repeat. The lines should be parallel.



▲ A small metal rule is the perfect tool for setting the router table fence and bit height.

GOOD HABITS

Success begins by developing good woodworking habits. Making these steps part of your routine can save both time and money.

ACCURATE TOOLS. The best results are only possible if the tools are accurate. That's why I try to always use the same tape measure for the entire project. Small differences between tapes can lead to errors. Another thing to check is whether your squares are actually square (far left photo). Few things can cause as many hard-to-fix problems as an out-of-square project part. Finally, using a steel rule to set up saw blades and router bits will improve accuracy. The near left photo shows you how.

Check your table saw, jointer, and other tools to make sure they're running true. With the fences squared and locked in, you can cut with confidence.

GETTING STARTED

After you've taken care of these common shop tasks, you're ready to dig into the plans. Here again, there's a logical flow for each phase of the project.

I like to photocopy the plan to keep it at hand while I work. I make notes on the copy and keep the original unmarked in case I need to revise it later.

READ EVERYTHING FIRST. Studying the entire plan before you begin can help you develop a strategy. This is a great time to make a few notes. Your goal here should be to understand the work flow and the details of each operation. Also, be sure to understand how to do each task. If you're going to change the plan, now is the time to work out the details of how changes impact the project.

INVENTORY. The next step is to make sure you have the tools (especially things like router bits) you need before you get started. This saves time.

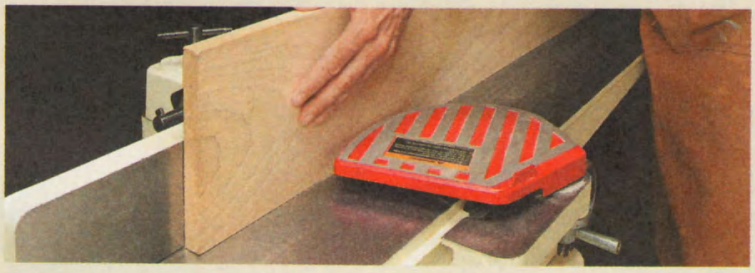
HARDWARE. I also make sure to have the hardware on hand before I begin. Sometimes the hardware specified in the plan has been discontinued or sold out, making it necessary to find an alternative. Another thing to consider is that some specialty hardware might vary in size from the plan.

CUSTOMER SERVICE. Call or email the publisher of the plans before you begin. You can usually find the contact information at the beginning of the book or magazine. Asking about any updates and corrections up front can save you some grief down the road.

SELECT & PREPARE THE STOCK

At this point, you're ready to make a trip to the lumberyard. Once again, there are a few guidelines to help you out.

SELECTION. Look for straight stock (no twist) if possible. There's no need to fight twisted, bent, or crooked lumber. Also match the pieces for similar color.



▲ After finding the right lumber for your project, bring it home and let it acclimate for a few days. Then, prepare it for use by jointing one edge and one face, and plane it to final thickness.

▲ No matter what the plan says, measure the opening and build the door to fit.

EXTRA STOCK. Buying 20% extra stock for your projects may be the best advice I can give. This allows you to pick and choose the grain and color for every part and to work around any knots or other defects in the wood.

MILL THE STOCK. When you get the lumber home, let it sit for a few days to acclimate to your shop. Then joint and plane it to the dimensions required for the project. The photos at left show the correct sequence.

DON'T GET AHEAD OF YOURSELF. Even though the plan has dimensions for every part, it's not a good idea to cut all the parts to final size up front. A few small deviations in one section can mean that all the parts you make later will need to be adjusted.

That's why it pays to measure as you build (photo above). In most projects, the fit is more important than the exact measurement (within reason). For instance, if you cut your face frame pieces to 1 7/16" wide instead of 1½", you can simply adjust the size of the drawer or door to accommodate the change.

SOME EXCEPTIONS. There are a few exceptions to this rule. For instance, don't be afraid to group similar operations to avoid extra blade changes or tool setups. A good example is ripping all the pieces to final width using the same fence setting for consistency.

BUILDING THE PROJECT

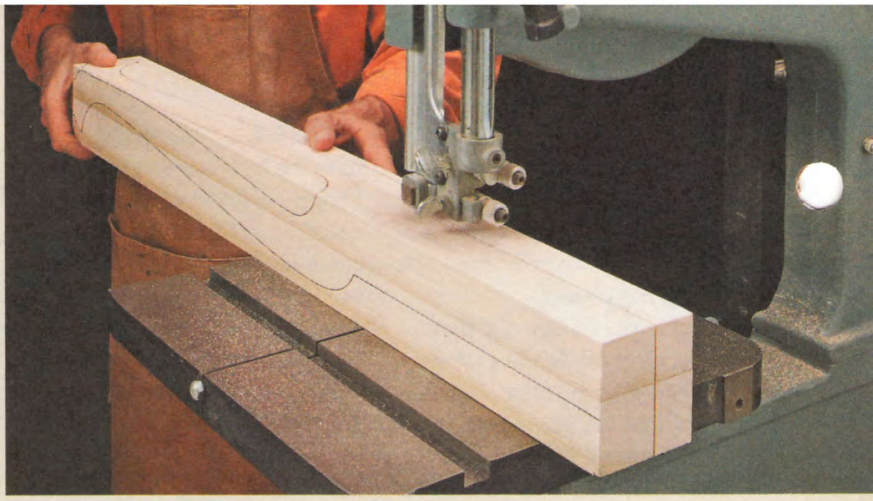
After you've prepared your tools and milled the stock, you're ready to get under way on sizing the parts for your project. This is where it pays to double check each operation and measurement.

MISTAKES. No matter how careful you are however, chances are a mistake or two will pop up from time to time. Sometimes you can cover your tracks, but sometimes only a new part will save the day.

Don't hesitate to make a new piece. This is why you milled extra stock. Many projects require lots of time and effort to build. You'll never regret going back and fixing a mistake now rather than living with it. (And even if you're the only one who notices, it can drive you crazy.) You can often use the "mistaken" piece to make a smaller part somewhere else.

PRACTICE. Of course, avoiding mistakes is still the best strategy. One way to do this when you try a new technique is to run through the entire procedure using an inexpensive test piece. For instance, if you've never shaped a cabriole leg, try your first one using a poplar blank (photo above). This way, if you make a mistake, you don't have to worry about replacing the expensive piece of cherry that matches the rest of your project perfectly.

Sometimes even inexpensive "two-by" lumber can be used, but avoid this for most joinery or carving operations. It simply machines too differently than hardwoods. That's why a handy supply of poplar is a great addition to the shop.



▲ Practicing a difficult cut, like a cabriole leg, on a piece of inexpensive wood can save you money. You can figure out all the tough parts of the cut without wasting expensive stock.

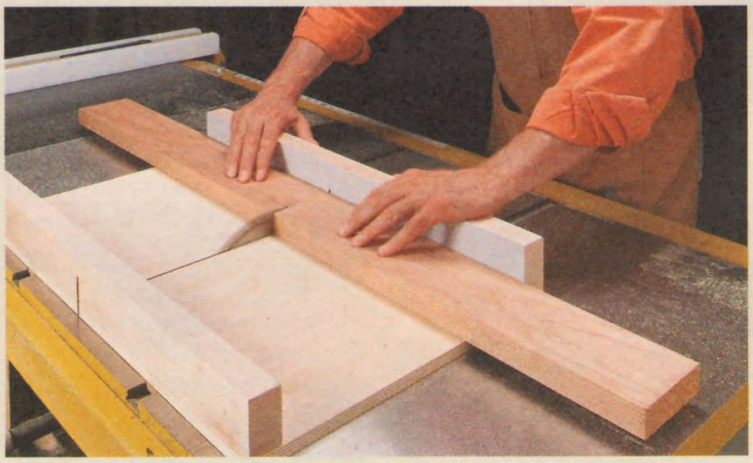
KNOW YOUR JIGS. Practice is great, but in woodworking, nothing beats a reliable jig. Jigs allow you to repeat operations by guiding a tool or the workpiece. They can be shop-made or commercially available, but they all take a certain degree of familiarity to work properly. It's up to you to understand how to build and use all of the jigs needed for a project.

There are many different ways and a variety of jigs to do any operation. The right way is the one you're comfortable with and gets consistent results. But I always keep some MDF in the shop in case I need to build a last-minute jig. The same is true for ¼" hardboard. It makes great templates.

TRUST YOUR INSTINCT. Sometimes, in spite of all your preparation, you're confronted by a situation that just doesn't "feel right." When that happens, there's a good chance that your instinct is correct. If any technique or particular cut makes you feel a little shaky, take a break to think things through. The photos below show one example and an easy fix.

Read over the plan again, and double check any drawings and photos. Take a minute; then set up again. Make a dry run and look for the unsafe points in the operation. Make sure you have push blocks, featherboards, or any other safety gear necessary for the operation. Are you using the proper blade or bit? Are you getting tired and ready to stop for the day?

▲ If it doesn't feel right, it probably isn't. Accurately crosscutting a long workpiece can be difficult if you only have the stock miter gauge for support.



▲ A simple crosscut sled makes sizing workpieces a breeze. Providing support on both sides of the blade, the sled enables you to cut more accurately, exactly on your layout marks.

Sometimes, even a safe cut can be intimidating if you've never done it before. But no matter what, never ignore the little voice in your head. It's usually signaling a reliable warning.

HELP. If you get really stuck, don't be afraid to ask for help. Ask a fellow woodworker if you can't figure something out. Chances are there's a woodworking store or club in your area that can offer advice, too.

MORE NOTES. I like to use *Post-it* notes to help keep track of where I am in the process of building a project. This is especially helpful when you don't get into the shop every day. The notes serve as a reminder of what's next on the "to do" list. You can also use them to label project parts so you won't get them confused during the building process.

MAKING CHANGES. Another situation that may arise, is the need to modify a plan. It's not unusual to want to change the size or design of a piece of furniture to suit your particular surroundings.

If you modify a design, make sure you understand all the implications and adjustments you'll need. The law of unintended consequences can cause some frustrating mistakes unless you're very careful. It's often here where errors are made (for example, forgetting to make the shelves longer after you widened the case).

I find it helpful to make a detailed sketch of the proposed changes, including all dimensions. If you use design software, like *Google SketchUp*, then you have the perfect tool for planning and adjusting all the pieces. Once you've figured it out, make a note so you won't forget, like the one shown in the right photo.

FINISH: DECIDE EARLY. One of the most common places that woodworkers run into problems is the finishing process. It's true that finishing can be a challenge, but like every other aspect of building a project, it all comes down to good planning and execution. And there are a few things you can do to make it easier on yourself.

First, make your finishing decisions early on in the planning process. Consider what might be the best finish for a particular project. Do you need stain or just a clear finish? Do you need to fill the grain for a smooth finish? Would dye help bring out the figure? Will you apply it by hand or spray? These are just a few of the decisions you'll need to make before you finish the project.

▲ When making changes to the project, it's a good idea to add notes to remind yourself of the details.

This is another opportunity to use some of that extra stock. Because it's a good color and grain match, you can experiment to create the perfect look.

Next, it's important to have plenty of supplies on hand before you begin. This includes brushes, solvents, and cleaning supplies.

Finally, you'll want to have a good area to finish. Somewhere away from the dust of the shop is best. But if that's not possible, then devote a few days to nothing but finishing. Keeping the dust out of the air will make a big difference in the end result. Often, finishing parts before assembly allows you do to a better job (box below).

Following these guidelines should give you a leg up on building from a plan. Now it's just a matter of finding a project you like and giving it a try. W

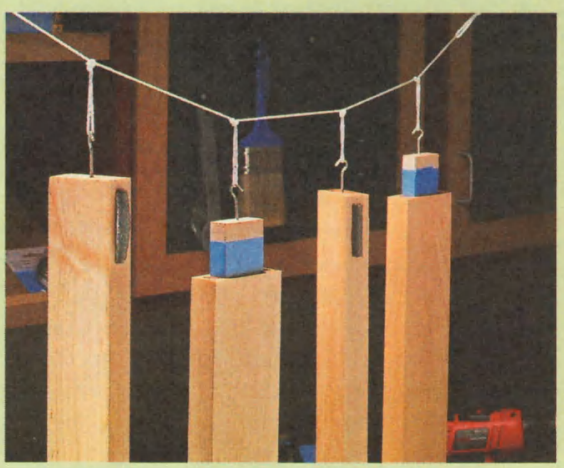
Time Saver: Prefinishing Project Parts

Finishing a project after it's assembled can be difficult and time-consuming. It's not too hard to brush or spray on the finish, but it can be a bear to keep the coat even and free of runs or drips. That's why I prefinish my project parts whenever possible.

Prefinishing allows you to apply a finish to the individual pieces before assembly. This means there are no nooks and crannies to reach into as you apply and wipe off stain or finish. You can easily see every surface of each piece and make sure you're getting the results you want.

The key is to keep finish off of or out of parts the will be glued together. The photo at right shows how painter's tape and foam insulation can be used to mask areas where you don't want finish.

You can also see an easy system for hanging the parts to dry. All you need to do is attach a hook in an inconspicuous place on each piece and then string a line to hang them on. I tie a knot about every 6" to provide a loop to hang the pieces. This prevents them from sliding around on the line. This system works great for many kinds of woodworking projects.



▲ A nylon line holds the prefinished workpieces while they dry. Masking prevents the finish from interfering with a good glue joint.

the key to a Winning Finish

With the right applicator, you can get a professional-looking finish. The trick is matching the tool to the finish.

We've all been there. Your project looks great. The joinery is perfect. You've scraped and sanded every square inch as smooth as glass. Now you're ready to apply the finish. But it's all too easy to goof up the finish and spoil a well-built project. Guaranteeing professional results relies largely on the type of applicator you use.

To help you choose the right brush, rag, or sponge for the job, I'll offer some basic guidelines. You should also take a look at the box at the bottom of the opposite page where you'll find some information on a different kind of finish applicator.

A brush is the most effective type of applicator for many finishes. They're made with either natural or synthetic bristles. Your choice depends on the type of finish you plan to use.

ALL NATURAL. China bristle brushes are made from natural animal hair (usually hog bristles). I use them to apply oil-based finishes like varnish, polyurethane, and alkyd paints. Hog bristles have natural split ends (splay) that leave fewer brush marks in the dried film than a synthetic brush. The splay also holds a lot of finish on the brush so you don't have to dip it so often.

Natural brushes aren't recommended for water-based finishes. They absorb water and the bristles get limp. For water-based finishes you'll want to use a synthetic bristle brush.

SYNTHETIC BRISTLES. When I apply a water-based finish like latex paint or clear polyacrylic, I always reach for a synthetic brush. Nylon is most common. The best of these brushes have artificially splayed ends so they too leave a smooth finish. Some nylon brushes are cut with a wedge at the bottom to further ensure a smooth finish.

DISPOSABLE BRUSHES. Of course, if you don't want to bother with cleanup, you can always use disposable applicators, either a brush or foam. Disposable brushes come with both natural and synthetic bristles. I use a throw-away brush for quick touchups or small parts that need finish before assembly, like wood drawer knobs. The downside is disposable brushes are thin and don't hold much finish, so it will take longer to apply finish to a large project.

FOAM BRUSHES. A disposable alternative to a bristle brush is a foam brush. They'll work for applying water-based finishes and some oil-based finishes. But they have a couple of drawbacks.

It's not a good idea to use them in shellac or lacquer, because the finish will dissolve the foam. Another problem I've encountered with sponge brushes is their tendency to generate bubbles in the finish. This happens especially when I scrape the excess finish on the edge of the can. The brush should just be dipped in the can and the excess allowed to run off before you move it to the surface of the project.

▲ For a bubble-free finish, avoid scraping excess finish on the rim of the can.

RAGS. To avoid bubbles and brush marks completely, you can use an absorbent rag to apply finish. While some finishes are made specifically to be wiped on, you can use a rag to wipe on any type of oil-based finish. I like to wipe on several coats with a rag. Each application will leave a thin, even layer that dries quickly.

For the best results use clean, cotton jersey or T-shirt rags. It's more absorbent than other fabric and it doesn't leave lint behind.

PAPER SHOP TOWELS. Another lint-free rag that's worth considering is a paper towel. You can use a shop towel made from paper to apply finish in the same way you'd use a cloth rag. Paper shop towels are made to hold together longer than kitchen paper towels and they're lint-free. They aren't as durable as cloth, so I just reach for a new one when they start to tear.

CLEANUP. It's always best to follow the manufacturer's recommendations for cleanup on specific finishes. But if you're unsure, mineral spirits will clean oil-based finishes and soap and water will remove water-based finishes from brushes. I thoroughly clean my good brushes and return them to the original package for drying and storage.

Occasionally I'll wash out a sponge brush or cloth rag a few times before I dispose of it. But before I throw it out, I always lay it flat to dry. This is especially important when you're using oil-based finishes which can ignite.

With these simple guidelines in mind, you'll have no worries when you're ready to put the finish on your next project. W

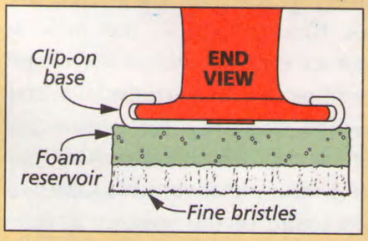
Disposable foam brushes are durable enough to wash and reuse

Lint-free paper towels work just as well as cloth

Cotton jersey rags work great for applying oil-based finishes

Worth a Look: Shur-Line Pad Applicators

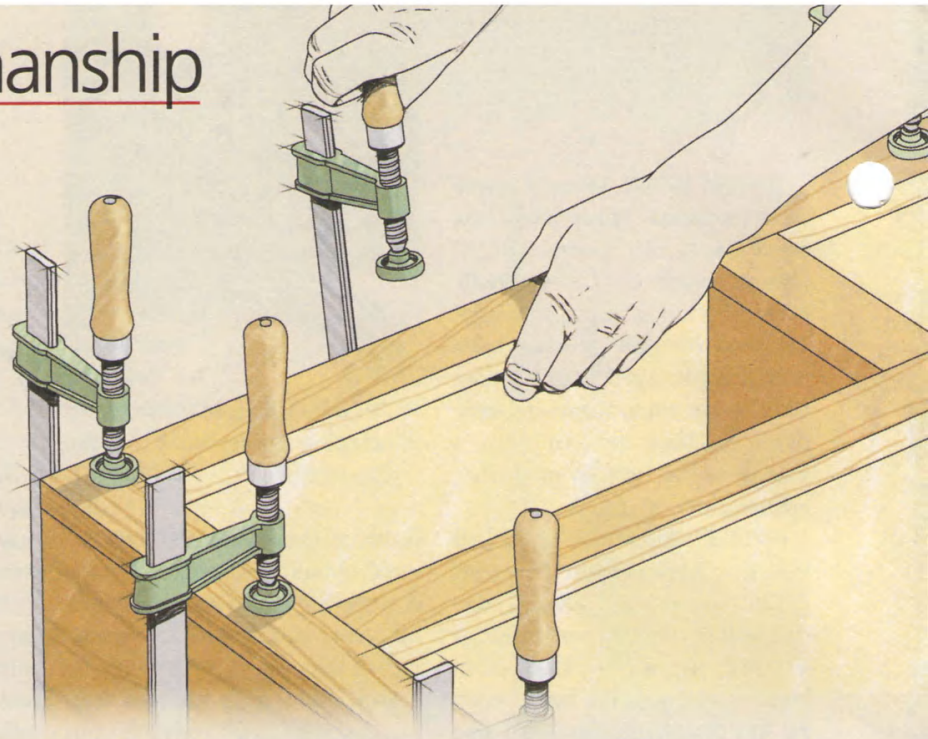
You get the advantage of both a bristle brush and disposable foam in this pad applicator from *Shur-Line*. These applicators have a sponge base that holds the finish and short, synthetic bristles to lay down a smooth coat This means you'll get a smooth finish in less time with these applicators.



The trim pad (right photo) is small enough to apply finish in tight spaces. The pads are made in a variety of shapes to fit any surface, even corners (top photo).

Trim pad

Corner pad



the secrets of a Face Frame

Adding a face frame to a cabinet serves more purposes than you might think. Here's what you need to know to build it right.

Almost all of the case projects we design and build incorporate a face frame. This is a fairly standard design feature and it seems like a pretty basic concept. The face frame simply creates the drawer and door openings.

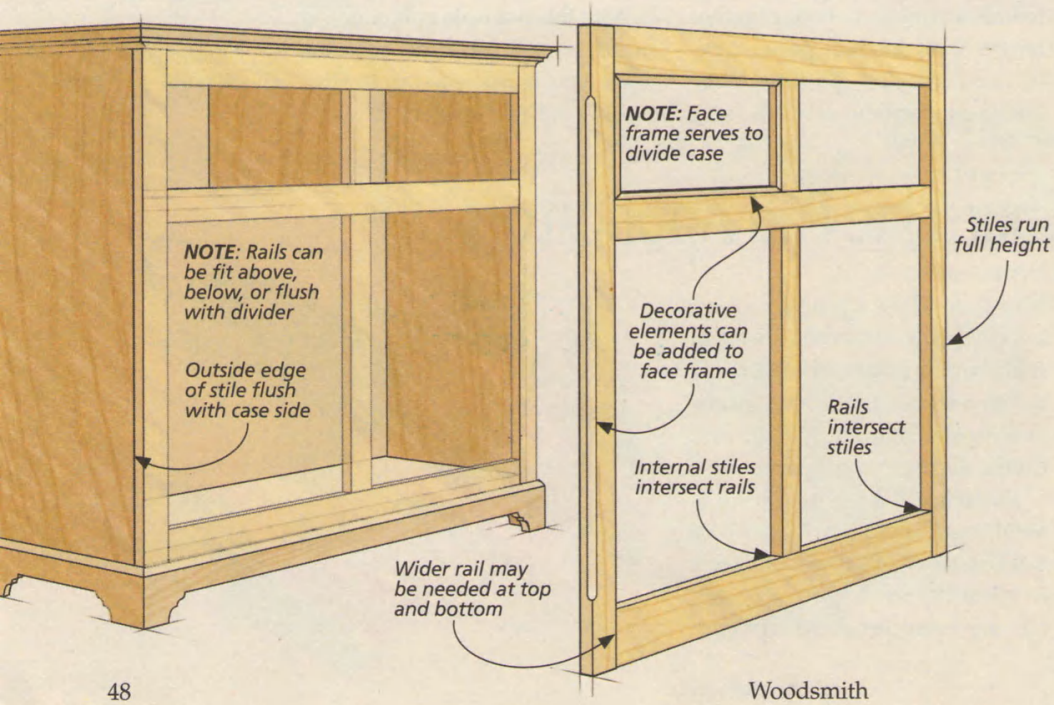
But in reality, when working out the details and fine-tuning a design, you find that there's a lot more to it. Beyond providing a grid that frames and divides a cabinet, a face frame serves structural and functional, as well as aesthetic, purposes. So when designing, building, and installing a face frame, you need to consider several factors. Here I'll offer an overview of the points you need to think about.

THE BASICS. A face frame is simply a framework made up of stiles (vertical pieces) and rails (horizontal pieces) that's installed on the front of a case. The lower left drawing illustrates the most common configuration of the parts. The outer stiles usually run full height while the rails butt up to them. Any inner stiles that divide the frame butt up to the rails.

The face frame pieces are generally positioned over and attached to the sides and dividers of the case. But this isn't always the rule. Sometimes the rails or internal stiles are "free floating," attached only to other parts of the face frame. This allows you to subdivide the case into door and drawer openings without having to add internal case dividers.

STRENGTH. In most instances, a face frame serves several important structural purposes. When you build a case with an open front, you're creating a weak point in its structure. Installing a face frame can help overcome this. It adds an extra measure of rigidity against the racking forces that can distort the shape of the case. This is especially true with large case pieces such as the cherry armoire on page 30.

Face frame members also serve to reinforce the individual case



parts — the sides and dividers. A stiff face frame stile glued to the long side of the cabinet will keep it from bowing and ensure that the openings stay consistent. Likewise, the face frame rails can help counteract any downward force exerted on the dividers.

FUNCTIONAL BENEFITS. A face frame also offers benefits in very simple ways. For one, it provides a place to mount hinges or catches for doors. And drawer guides or runners can also be mounted or hidden behind face frame parts.

Face frames can make building cases with plywood easier and more practical. The exposed edges of the plywood can simply be covered by the frame parts.

Sometimes structure, appearance, and function overlap in a face frame design. The lower right box shows a good example.

BETTER APPEARANCE. However, face frames are not installed for strictly utilitarian reasons. They can also be used to enhance the visual appeal of a cabinet.

Without a face frame, the front of a case can lack depth and "bulk." And doors and drawers may lack the spacial separation needed for the best aesthetic effect. A well-proportioned face frame can make the difference.

A face frame is also a place to add detail. A simple bead molding along inside edges can set off the doors or drawers. Or a chamfer routed on the edge of the outer stiles can act as a visual transition at the corners of the case.

PART SIZE. One of the first details to consider when building a face frame is how to size the parts. Most of our face frames are cut from ¾"-thick stock, however the width of the parts can vary quite a bit. This will affect both strength and appearance.

There is no firm standard for the width of face frame parts. The trick is to size the parts to meet your design considerations. My loose guideline would specify that stiles should be at least 1½" wide and rails 1¼". Obviously, the width of the stiles and rails will affect both its structural and aesthetic effect.

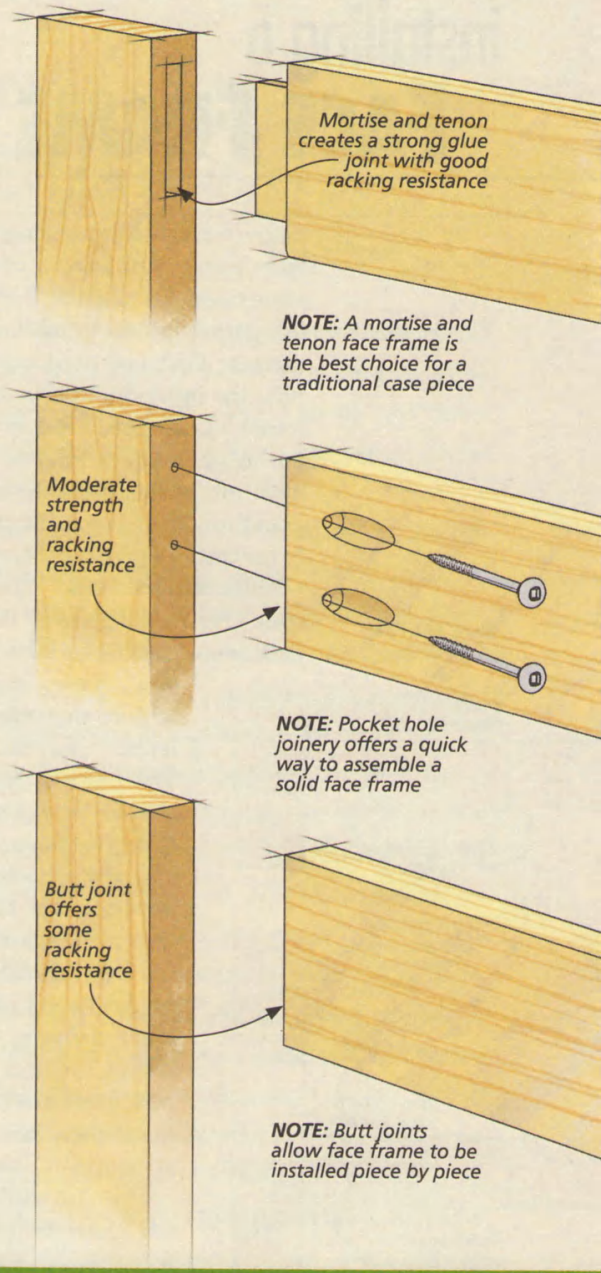
Often, it's necessary to vary the width of the rails on a particular case. The upper and lower rails can be made wider to accommodate moldings that will be added to the case (lower drawing, opposite page). But, it's usually best to limit the width of the dividing rails in order preserve access to space within the case.

JOINERY. A face frame can be assembled in a number of different ways depending on what you need to achieve. Several of the joinery choices are shown in the drawings at right.

When maximum strength and racking resistance are the goals, the stiles and rails should be fastened together with a strong glue joint such as mortise and tenon or half-lap joinery.

A second tier of joinery options offers a tradeoff between strength and efficiency. Although not quite as rigid or long-lasting, pocket hole, dowel, or biscuit joints make up for this shortcoming by being fast and easy to create.

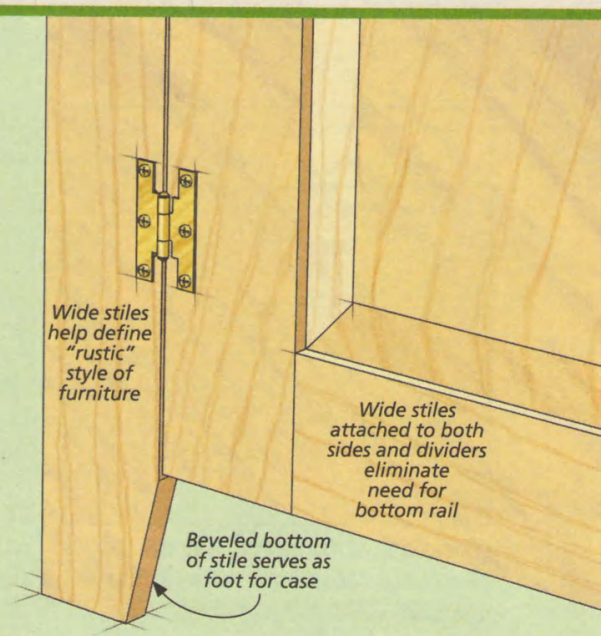
A small case may not need a rigid face frame. In this instance, I'll simply install the parts with butt joints alone. However, all the frame parts will need to be securely attached to case parts.



Triple Duty

Wide side stiles (4" to 5") are commonly found on some traditional styles of furniture such as Shaker or Early American. This design feature simplified the construction while serving multiple purposes.

The wide stiles can be attached to both the case sides and the dividers — stiffening the case while eliminating the need for face frame rails. And as you see at right, the bottom of the stile functions as a foot for the case. Finally, the wide stiles make a subtle and pleasing aesthetic statement.



installing a FACE FRAME

Before you can start building your face frame, you have a couple more decisions to make. Both are in regard to its final installation on the case. First, you need to know how the individual parts of the frame will be positioned in relation to the case parts. And the final question is the method you're going to use to attach the frame to the case once it's constructed.

POSITIONING THE PARTS. When it comes to the alignment of the face frame pieces on the case, you have a few options that offer different advantages. The frame is almost always designed so that the outer stiles end up flush with the outside edge of the case sides. But rather than try to hit this fit dead-on, I like to make the stiles a bit extra-wide and then trim them flush after installation (drawing at right).

The drawings at left illustrate the different ways a rail can be fit to a divider. The most common is to place the rail flush with upper surface. This will give you the clean look you may want for a door opening or the flat surface you need for a drawer or shelf.

The only catch is that this requires very accurate assembly and installation of the face frame. This finicky work can be avoided by setting the rails either above or below the edge of the divider. A rail sitting proud can create a useful lip that helps contain items in the case. (The cherry armoire on page 30 features this handy trick.)

When doors are going to be added to an opening, you can place the rail about ¼" below the top surface so the edge of the divider can act as a ready-made stop. If you do this, the divider will have to be solid wood or plywood with an applied edging.

ATTACHING THE FRAME. The last step is to attach the frame to the case. You have two goals here — to align it on the case properly and then to hold it there solidly and permanently. The drawings across the bottom of the page show a few different examples.

One of the easiest ways to attach a face frame and my first choice is to simply glue it to the front of the case using lots of clamps. A tight glue joint between the face frame and either a solid wood or plywood case will form a very strong and permanent attachment. This basic method has proven itself over the years.

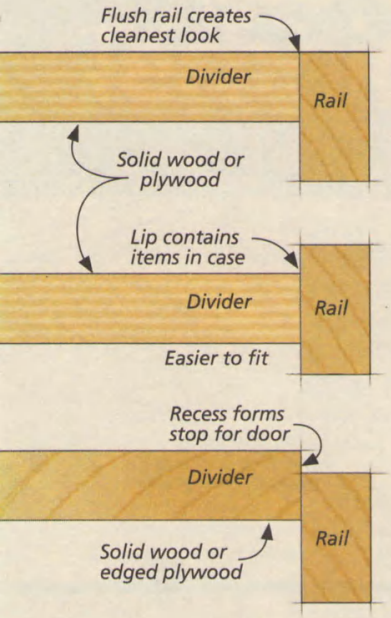
Mechanical fasteners such as nails or screws can take the place of the clamps during the glueup. The drawback to this assembly method is that you'll have to fill the nail holes or plug screw holes.

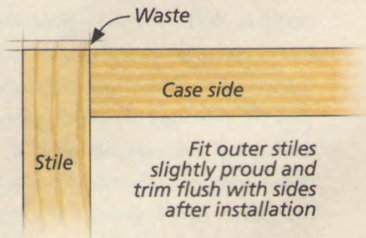
When you want to guarantee accurate alignment, you can add joinery between the face frame and case such as a rabbet or a tongue and groove joint. This will also add strength to the assembly, but on the downside, it adds another degree of difficulty to building and fitting the frame.

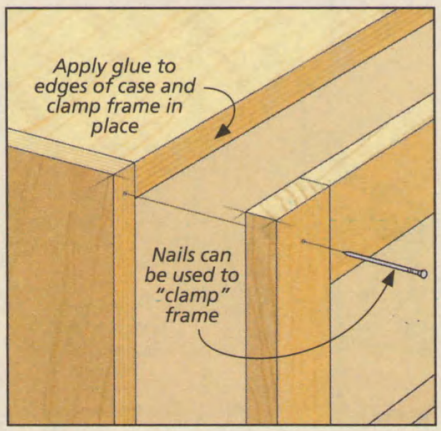
You can compromise and use biscuits or pocket screws to achieve the same end. But again, it's debatable whether this extra work is worth the payback.

I guess that there are two basic lessons here. The first is that adding a face frame to a case makes good sense. Second, there a lot of ways to get the job done. W

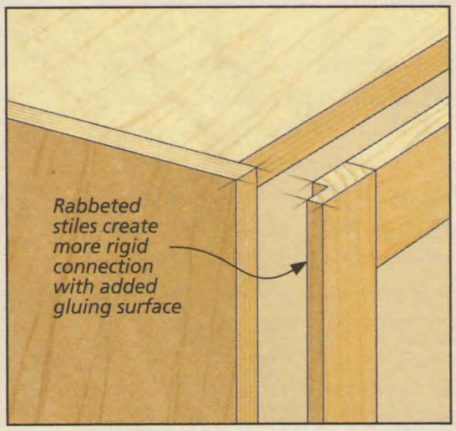
SIDE SECTION VIEW



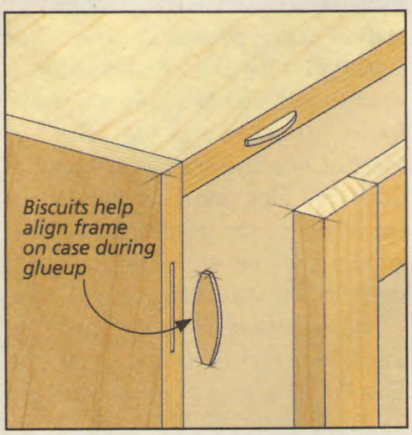




Glue alone is the easiest way to install a face frame. Nails can be added to "clamp" it in place while the glue dries.



Rabbeting the stiles to fit the over the case sides helps with alignment and creates a stronger connection.



Biscuits can be fit between the face frame and case to help keep things aligned during assembly.

Sources

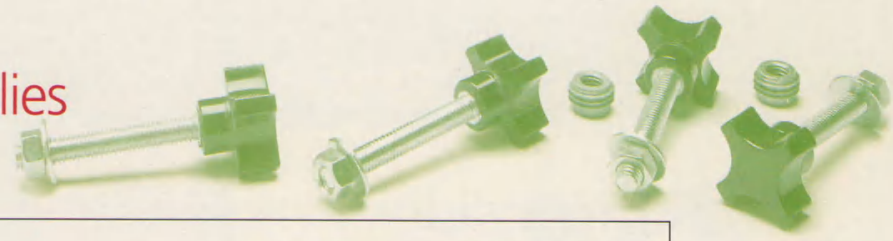


TABLE SAW BLADES

To get the most out of your table saw you need to use the right blades. The *Freud, Amana,* and *Forrest* blades shown in the article on page 8 can be found at several of the online retailers shown in the margin.

FIVE HAND TOOLS

Hand tools can be a great help to all your woodworking projects. For the article on page 10, I used a *Lie-Nielsen* 9½ block plane and medium shoulder plane. The card scrapers, *ryoba* saw, and chisels are available through *Rockler, Lee Valley* or other online woodworking sites.

FAST JOINT JIG

If you're looking for some unique joinery options, the *Fast Joint Precision Joinery System* might be just what you're looking for. Take a look at the article on page 12 to see what it can do. It's available through MLCS.

BENCH

I used a bowl & tray router bit to shape the bench seats. You can find this bit at *Woodcraft* (825834) or similar bits at several other online retailers.

An oil finish really brings out the beauty and depth of the wood (I used *General Finishes' Seal-a-Cell).* Then I sprayed two coats of lacquer.

CRAFTSMAN LAMP

Building the lamp on page 22 involves more than just woodworking. The good news is, the techniques for cutting and assembling stained glass aren't difficult. On top of that, there are a couple of online retailers listed in the margin that can supply everything you'll need to build the lamp.

For all the glass and associated supplies, you can go to *Glass Crafters.* The two types of glass are: *Kokomo Opal Orange* (K4-254D) and *Spectrum Light Orange, White Wispy* (S5-379.1). In addition to the glass, you'll need solid-core solder (C6040), flux (508), a roll of copper foil (4014), and black patina (530). Another supplier, *Warner Stained Glass* carries all the materials you need.

For the electrical parts, I turned to *MyLampParts.com.* The list of parts is pretty long, but not too expensive: 3-wire socket (SL19053LEV), porcelain base socket (SL19123P), 35W candelabra bulb (SL03224), 11/16" brass neck (SL01117), brass coupling (SL00816), 3" brass nipple (SL04386), 4" brass nipple (SL04388), ⅛" brass nut (SL02251), 18 ga. electrical cord (SL19715), harp (SL15207), and the harp bottoms (SL20640). The shade (ESK9551) came from *EveryLampShade.com.*

To finish the lamp, I used *Varathane Mission Oak* stain. Then, I wiped on a coat of *General Finishes' Seal-a-Cell* and followed up with two coats of sprayed lacquer.

ARMOIRE

The armoire featured on page 30 requires some hardware. I found the hinges (00H51.33), the door pulls (01A23.75), and the drawer pulls (01A23.73) all at *Lee Valley.* I ordered the shelf-support pins (22773), magnets (26534), and the drawer stem bumpers (28373) from *Rockler.*

The base and top of the armoire were painted black. The rest of the unit was stained with three parts *Zar* stain and one part *Woodkote Jel'd Stain* (both cherry). I sprayed the whole piece with lacquer. W

MAIL ORDER SOURCES

Project supplies may be ordered from the following companies:

Woodsmith Store
800-444-7527
Chisels, Finishing Supplies, Saws, Scrapers, Table Saw Blades

EveryLampShade.com
888-235-7978
Lamp Shade

Glass Crafters
800-422-4552
glasscrafters.biz
Stained Glass & Supplies

Lee Valley
800-871-8158
leevalley.com
Chisels, Door Pulls, Drawer Pulls, Hinges, Saws, Scrapers

Lie-Nielsen
800-327-2520
lie-nielsen.com
Block Plane, Shoulder Plane

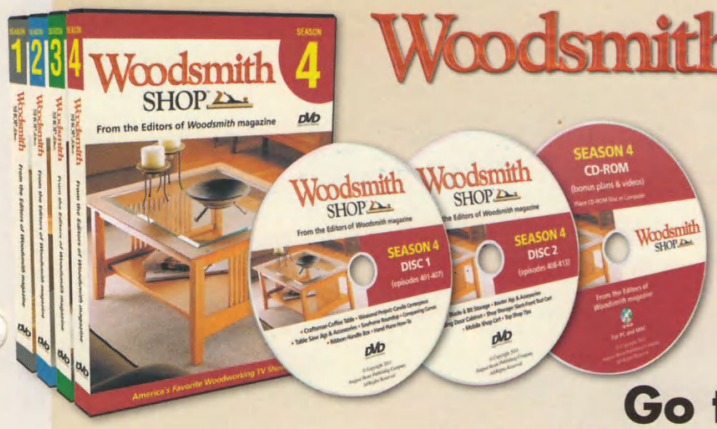
MLCS
800-533-9298
mlcswoodworking.com
Fast Joint Precision Joinery System

MyLampParts.com
773-539-7910
Lamp Electrical Parts

Rockler
800-279-4441
rockler.com
Chisels, Finishing Supplies, Magnets, Saws, Scrapers, Shelf-support Pins, Stem Bumpers Table Saw Blades

Warner Stained Glass
800-523-4242
warner-criv.com
Stained Glass & Supplies

Woodcraft
800-225-1153
woodcraft.com
Bowl & Tray Router Bit



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looking inside
Final Details

▲ *Entry Bench.* Whether you choose to build the painted version shown here or use a natural finish, the flowing lines of this bench are sure to please. You'll find complete plans on page 16.

▲ *Cherry Armoire.* With shelves, drawers, and an open compartment for hanging clothes, this armoire provides versatile storage options. Frame and panel construction and a two-tone finish give it an attractive appearance. Turn to page 30 for all the details you need to build it.

▲ *Craftsman-Style Lamp.* A three-position switch allows you to illuminate the upper and lower bulbs of this Craftsman-style lamp individually or together. But the stained glass panels in the base of the lamp are what really catch your eye. We'll walk you through the process for making them step by step. The experience begins on page 22.